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MARCH 1966

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NATIONAL PHOTOGRAPHIC INTERPRETATION CENTER

OPERATING PROGRAMS FOR FY 1967

PROGRAM PLANS AND PROPOSALS FY 1968 - FY 1972

Declass Review by
NIMA/DOD

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NRO review(s) completed.

GROUP 1
Excluded from automatic downgrading and declassification

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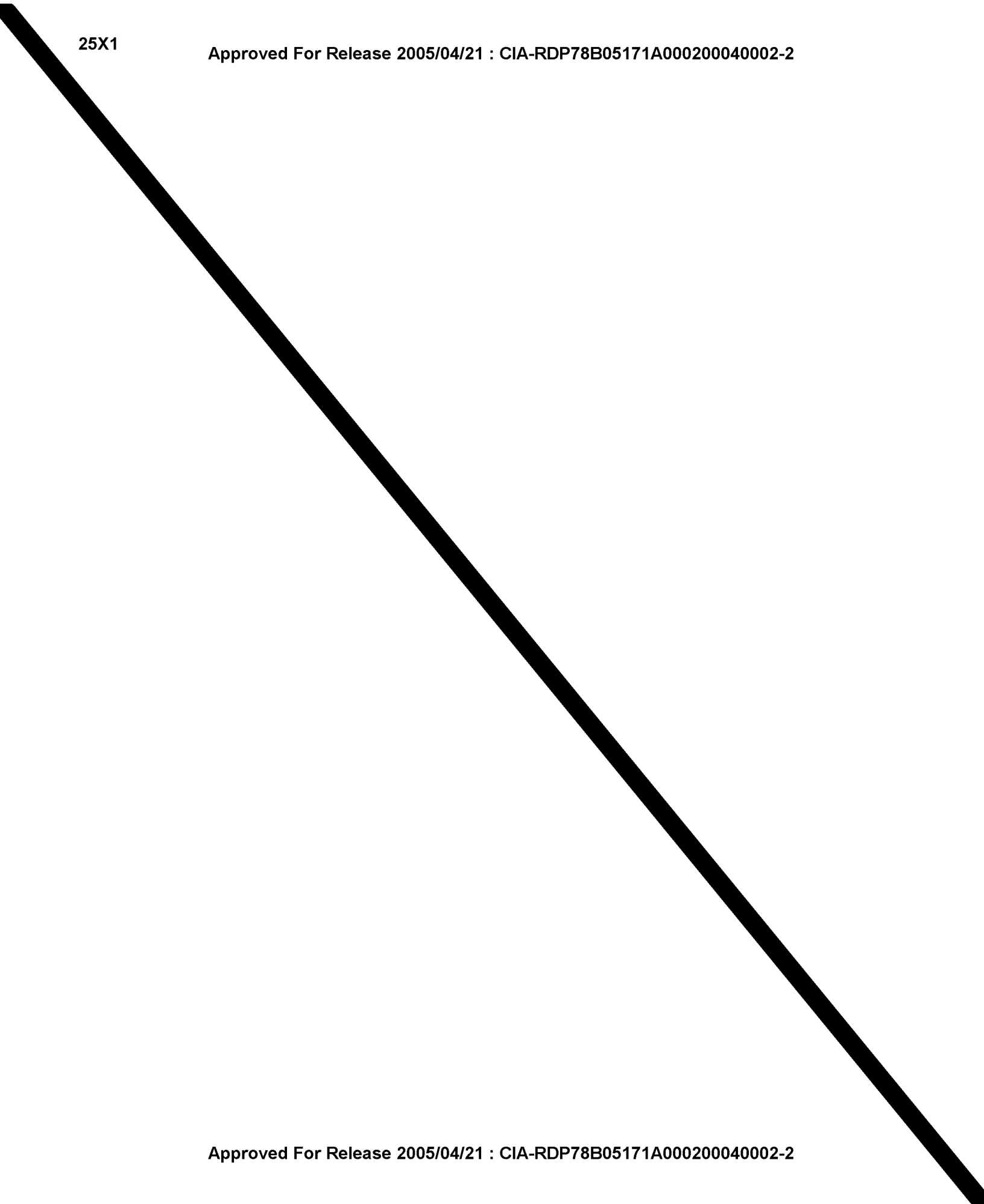

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NATIONAL PHOTOGRAPHIC INTERPRETATION CENTER

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INTRODUCTION

In ten years of existence NPIC has become the acknowledged leader in the exploitation of imagery collected from national reconnaissance programs, handling, by one means or another, the output from every collection system delivered to it. The history of its efforts, however, clearly shows that the resources to cope with the mounting workload have been late in coming and insufficient in quantity.

Now, new, bigger, more sophisticated and diversified systems are coming calling for even greater efforts and resource allocations. Preparation for exploiting the proceeds of these systems must be organized on a long-term basis and steady progress made toward achievement of a capability, adequately staffed and equipped to meet future needs. Fit and start progress in funding and staffing a heavily instrumented, high volume, scientific program such as this simply will not do the job.

High on the list of necessities is a well financed, well planned R&D program working towards future needs at least five years in advance. Such an effort is the life blood of the Center and must be provided if it is to match the rapid advances in reconnaissance technology. Only through an orderly developed and operating R&D program, working closely with imagery exploitation production elements, can the rising demands for increased personnel needs be levelled off.

Equally important are the needs for increasing numbers of qualified, scientific and technical people trained and ready to handle the workload at the time it arrives. Personnel recruitment programs must be imaginatively carried out to attract the numbers and quality of people needed in an increasingly competitive market. New and expanded training programs must be devised and conducted early enough to prepare personnel for more complex and demanding assignments in a heavily instrumented Center.

The need for adequate space is also at the top of the list of priority requirements to meet the future needs of this activity. In addition to the requirement for building space to house the growing numbers of people, the equipment being developed for imagery exploitation is growing larger and more complex requiring special environments as well as larger areas. Because of long lead times involved in building acquisition, priority attention must be given to this increasingly pressing need.

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In order to plan for and manage this expanding program, continuity in development is a necessity and early decisions must be reached on major items of vital importance to its success. This study presents the plans and proposals needed to achieve that success and should be given early and favorable consideration if we are to maintain our leadership in this field and reach the overall goals and objectives of the Agency and the Intelligence Community.

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ARTHUR C. LUNDAHL
Director
National Photographic Interpretation Center

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PART I. OPERATING PROGRAMS FOR FY 1967

A. Information Processing and Exploitation - National Imagery Exploitation

1. General

The National Photographic Interpretation Center serves as the focal point for U. S. Government photographic intelligence activities and is responsible for producing photographic interpretation reports and providing photographic intelligence services in support of the national intelligence effort as well as support to departmental activities when these services can be provided without degradation of national responsibilities. Primary emphasis is given to immediate responsiveness to priority national intelligence objectives through rapid, preliminary photographic interpretation and comprehensive photographic analysis utilizing, whenever appropriate, related collateral information.

The National Imagery Exploitation Program is carried out totally within NPIC and is comprised of the production elements of the national Center excluding its computer services. These elements include: the NPIC Photographic Analysis Group which performs interpretation and analysis of the imagery; the Technical Intelligence Division which furnishes mensuration services and technical photographic analysis; the Collateral Support Division which provides map and reference services and a full range of support from a variety of classified and open sources; the Publications Division which provides editorial and graphical support; and the Production Services Division which supplies photographic laboratory services, a reproduction and printing capability, dissemination and control services, and file maintenance and courier operations. Also covered in this program are the General Management requirements including the Office of the Director, NPIC, which provides overall management and direction of the imagery exploitation effort, staff support elements of the Assistant for Administration and the Assistant for Operations.

2. Historical Origins of the Program

a. Development of a PI Capability in CIA (1952-1961)

A photographic interpretation capability was first created in CIA in 1952 when a small staff of seven people was established in the DDI Office of Research and Reports. From the beginning the volume of materials to be worked far exceeded the capability

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of the staff and only a minimal effort could be carried out in a few isolated fields. The types of materials being received included clandestine hand-held photography, captured German World War II photography, Air Force photography taken on the periphery of the Soviet Bloc known as SENSINT, and balloon photography over the Soviet Union known as GENETRIX.

In December 1954 planning commenced for the exploitation of photography from the U-2 which was scheduled to begin delivering materials by mid-1956. In developing this exploitation program, new approaches were used in the photographic interpretation process and included from the beginning a team concept. There were three prime goals established which remain today as guide posts to the exploitation concept. These include:

(1) Provide the photo interpreter with all-source collateral intelligence to assist him in his interpretation of objects imaged on photography.

(2) Provide the photo interpreter with all forms of support necessary to the proper performance of his job including mensuration, editorial, graphical, photographic laboratory, etc., in order that his full attention can be devoted to the task of viewing and interpreting the photography.

(3) Produce timely, independent and unbiased photographic interpretation reports which are uniformly disseminated to USIB member organizations as required.

To provide the capability and fulfill the established goals, a new organization was formed in early 1956 under the codeword HTAUTOMAT which combined the small photo interpretation staff in ORR with a larger element of collateral, document, machine and other types of support specialists taken from the DDI Office of Central Reference. The strength at that time totalled only 42 people.

In July of 1956 the first U-2 mission was received and from that time forward NPIC and its predecessor organizations have been struggling to build and equip an organization capable of handling the continually increasing volumes of high quality film which have been collected.

Throughout the period 1956-1961 the U-2 remained the principal collection vehicle and in its peak year FY 1959 some 82 missions were flown producing over 450,000 linear feet of film. The U-2

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shootdown in May 1960 over Sverdlovsk temporarily restricted the program, but by August of 1960 only three months after the incident, the first KH-4 satellite mission was accomplished and the Center was thrown into a new era of exploitation.

Plans had been formulated by the Center and requests made for increased personnel resources and in December of 1960, a T/O of [redacted] was authorized. The ceiling, however, was not increased until well into the year 1961 thus delaying the addition of badly needed personnel.

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b. Establishment of NPIC (January 1961)

Planning was taking place on other fronts at the same time, however, and in December 1960 the Joint Group Report on Foreign Intelligence Activities (the Kirkpatrick report) was issued. Among the various intelligence programs covered by this report was that of overhead reconnaissance. This report emphasized the growing importance of photography as a major source of foreign intelligence and pointed out that the U-2 program provided probably the greatest amount of valuable information obtainable from any single source. The report recommended the establishment of a national PI center and called for the preparation of a National Security Council Intelligence Directive designed to provide authority and assign responsibilities in the photographic intelligence field.

In January 1961 NSCID #8 was formally approved charging the Director of Central Intelligence with providing a National Photographic Interpretation Center as a service of common concern. High among its principal responsibilities were those of rapidly providing and distributing interpretation reports of photographic detail with supporting references to related collateral material. The concepts underlying the creation of a national exploitation organization were stated in the papers proposing and accompanying the NSCID and included the following statements:

(1) "No complete separation of interests is possible or desirable in photographic intelligence activities."

(2) "To promote an integration of effort and to avoid unnecessary duplication and expense, a coordinated interdepartmental approach to the exploitation of photographic intelligence shall be established."

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(3) "Certain photographic intelligence functions can best be performed as a central service of common concern for the maximum benefit of the entire Intelligence Community."

Overall, the basic concept or purpose in the creation of the national center can be said to have been that of ensuring the most effective, timely and economic exploitation of photography for foreign intelligence relating to the national security.

c. Growth of NPIC (1961 to date)

The establishment of NPIC as a formal national organization brought new impetus to future planning for the Center and a committee of representatives from the military services, State Department and CIA was convened to consult on the methodology of operation, organization and plans for this new Center. In late 1961 requests for increased personnel strength were approved and this time the ceiling authorization was granted as well. By then the resolution of the KH-4 system was improved from its initial resolution of approximately 50 feet and periodicity of missions was already being planned for one per month. During this period, U-2's, although no longer used over the Soviet Bloc, were still in active use in other areas of the world, including China, North Vietnam, Laos and Cuba. By the beginning of FY 1963, planning was underway for a new satellite reconnaissance system known as KH-7, ground coverage and resolution of the KH-4 system had been vastly improved, U-2 flights were still in use around the world, and low-level military aircraft missions were being received in the Center for exploitation. The KH-4 system with its greatly increased ground coverage opened vast new horizons and the resultant demands placed upon the Center far exceeded its capabilities, particularly in the field of detailed analysis.

The Cuban Missile Crisis came in October 1962, and it was in NPIC that the original Soviet missile threat was discovered and the word first flashed to the Director of Central Intelligence and the White House. The Center was the focal point of the readout of all Cuban overflight photography - a task that still continues today. The Center operated for weeks on end on a 24-hour-a-day basis reading out all significant items of both the high- and low-level aircraft collection efforts.

In the fall of 1962 and prior to the Cuban situation, the Center once again established the need for an increased staffing authori-

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zation and [redacted] positions were approved. Almost immediately, however, the ceiling was reduced to [redacted] and shortly thereafter increased to [redacted]

The beginning of FY 1964 brought with it another request from NPIC for an increased T/O to cope with the then planned collection inputs. An approval was given in late 1963 for [redacted] positions, but the personnel ceiling was arbitrarily adjusted in February 1964 to [redacted] thereby bringing almost to a halt a highly productive recruitment effort which had been underway and which had enabled the Center to increase its strength by almost [redacted] during the previous year. The ceiling was later increased to [redacted], but the momentum of the large recruitment effort mounted in 1962 and carried on through 1964 was not regained until late in 1965.

In July 1963 the first successful KH-7 mission was flown inputting to the Center for the first time high resolution satellite photography of significant targets in the Soviet Bloc and other denied areas of the world. The following month, in August of 1963, the first "double-bucket" KH-4 mission was received greatly increasing the volume of the satellite program inputs. Since that time the volume and quality of film inputs has steadily increased and in FY 1965 the Center received 3.1 million linear feet of film from all collection systems. This has been the result of various world crisis situations around the world as well as increased reliability of the satellite systems. Today NPIC is handling inputs from 17 low-level aircraft programs, 5 high-level aircraft programs and two satellite systems. Immediate readout of all systems is taking place in a timely fashion, but second-phase exploitation is often delayed and detailed reporting is falling far short of meeting the demands of the Community quantitatively and from a timeliness standpoint.

Because of the high yield of intelligence information from overhead reconnaissance systems, plans for the development for new and more exotic collection systems have been pushed rapidly. To prepare the Center to handle the inputs from these new systems, a detailed study was carried out in April 1965 projecting the Center's needs for resources during the next 5 years. In this study the Center estimated its needs for personnel in the National Imagery Exploitation Program as [redacted] in FY 1966 and [redacted] in FY 1967. Total funding requirements for this program were estimated at [redacted] for FY 1966 and [redacted] for FY 1967. Despite intensive reviews by numerous panels and committees and general agreement with the stated needs of the Center, ceiling restrictions to date permit the assignment of only [redacted] personnel to the program

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25X1 in FY 1966 and personnel in FY 1967 to the National Imagery Exploitation Program. Current funding authorizations for this program have been restricted to 25X1 million in FY 1966 and million in FY 1967.

3. The Production Process

General Management and direction of the National Imagery Exploitation effort is provided by the Director, NPIC and his immediate office, with staff support from the Assistant for Administration and the Assistant for Operations. The requirement of these key elements of the Center are included in this program and comprise the Office of the Director, the Management Services Staff and Support Staff under the direction of the Assistant for Administration and the Operations Staff under the direction of the Assistant for Operations.

Within NPIC the imagery analysis activities are carried out in the Photographic Analysis Group (PAG) staffed jointly by CIA and DIA interpreters. The Photographic Analysis Group is responsible for exploitation of imagery in response to national or Community-wide requirements, preparing national photographic interpretation reports and providing photographic interpretation services utilizing all types of photography and pertinent collateral information. Major functions of the Photographic Analysis Group include performing preliminary photographic analysis of priority national intelligence targets of all-source photography; indexing and summarizing items of intelligence significance from photographic inputs; scheduling the production of national photographic interpretation reports; and providing other photographic interpretation services as required. In addition, substantive briefings are conducted on photographic analysis maters and support is provided to USIB agencies, committees and consultant groups in the preparation of national estimates and finished intelligence.

The NPIC Photographic Analysis Group derives a broad range of support and services from production support divisions in NPIC which also support departmental PI components and other elements of the Intelligence Community when these services do not detract from the first priority national effort. The requirements for four of these support divisions are included in this program with the fifth, computer services, being set forth in a separate subcategory entitled ADP Systems.

All of these elements operate in a smoothly functioning production process in which the various phases of photographic intelligence reporting are carried out. In the first phase, immediate reporting

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is accomplished on all high priority COMOR targets with significant changes noted and new bonus targets reported on. Briefing aids are prepared on significant items and briefings conducted for various high-level officials in the Government and the Intelligence Community. Following the initial readout, a complete frame-by-frame scan is conducted of the mission in which all intelligence targets of significance are noted, changes reported from previous coverage, and the mission completely indexed and stored in the Center's expanding data base. Following this, a series of increasingly detailed reporting is accomplished in which various types of reports are produced including short reports of selected targets called Briefs, Order of Battle reports and comprehensive reports on significant industrial complexes, nuclear energy testing and production sites and missile and electronics activities. At the same time the support divisions provide a wide range of national services to various customers in the Community such as support to developers of collection systems through technical evaluations of camera performance, collateral research services to various members of the Community, photographic laboratory support and the like. Provision of these services insures that all elements of the production chain are completely engaged at all times and provides for full utilization of the resources of the Center.

Of growing importance to the management of this production process as well as to the Center's planning and programming efforts is the operation of a Center-wide Management Information System (MIS). This system, which has been in operation for over two years and is the first of its kind within CIA, provides for the collection of manpower usage and production data from all Center components and for the utilization of a computer to provide various management information reports. By sorting this vast array of data in the computer, a number of different types of analyses may be made showing how the Center's resources are being expended and providing a base for projecting future Center resource requirements. Under the system all requirements levied on the Center are converted into projects which are numbered and used as the basic reference point for correlating the data. All employees of the Center fill out daily time sheets showing time expended against projects which they are working on and functions performed in carrying out the work. This information is coded for input into the computer so that various machine runs may be obtained showing such items as time expended against the exploitation of a given collection system, time spent against detailed reporting by function or area, manpower expended for the different types of national services performed within the Center, etc. The data obtained from the Management Information System is used by all Center managers in the day-by-day administering of their respective components and also is the basis for the manpower estimates contained in this program description.

4. Funds and Tangible Resources

Following the creation of the National Photographic Interpretation Center in January 1961, a concerted effort was undertaken at the request of the White House to provide the Center with necessary space to house the expanding personnel and equipment resources. [redacted] was chosen as the site of the new Center and a crash construction program was undertaken to convert this former warehouse into the most modern and complete photographic intelligence facility in the world. Construction was completed in one year and the building was occupied on 1 January 1963. Construction costs ran to about [redacted] and approximately [redacted] gross square feet of space was made available for the activity. The building was designed to house about [redacted] people, and it is rapidly nearing its capacity. In January 1966 the population of all building components including CIA and military personnel exceeded [redacted] people. Designed specifically to carry out an efficient imagery exploitation function, [redacted] has many unique features. The imagery analysis activity is located on the middle floor of the building and the supporting services clustered around it in such a way as to permit a smooth flow of the production process. To protect the highly classified materials which the Center handles, the building contains a most complete and up-to-date physical security system. Most of the work is carried out within working vault areas which permits protection of the vital security information yet permits the free flow of production without unnecessary restriction. The building contains some of the most modern technical features available for photographic interpretation activities including special temperature-humidity controlled areas, clean room facilities, deionized water system, chemical tank farm, special lighting systems and many other such features specifically designed for imagery analysis activity. Total value of the Center's equipment inventory stood at about [redacted] by mid FY 1966 and included a wide array of photo interpretation and supporting technical equipment. In addition to the above tangible resources, the Center has available in its film storage area all of the satellite photography collected since the inception of the program as well as large amounts of U-2 and other aircraft coverage of significant areas of the world. In addition to the 15.5 million feet of film stored immediately in [redacted] over 100 million linear feet of film collected from various reconnaissance programs is available from other film repositories in the Washington area.

Funds allocated have steadily increased over the years, although budget requirements consistently have been reduced to well below requested levels. The effect of these reductions has been further compounded by delays in granting of fiscal year funding allocations until well into the fiscal year creating uncertainties and delays in the rate of expansion of the program. In FY 1966, over half of the fiscal year had passed before the Center received its first

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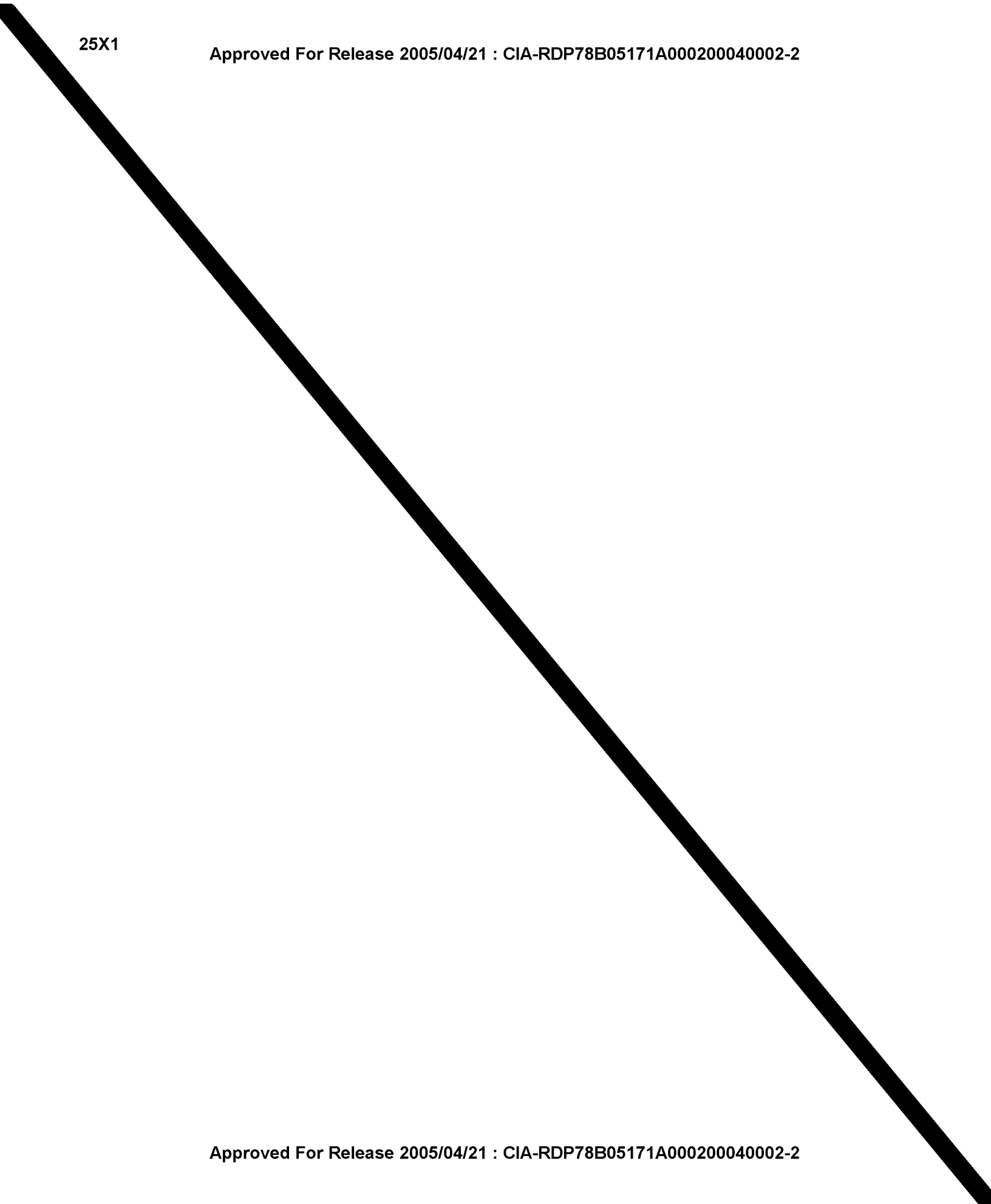

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funding allocation, and over two-thirds of the year had passed before a firm figure was received for its fiscal year allocation. In FY 1965 was expended on the National Imagery Exploitation Program of which was for personal services for supplies and equipment, and for other miscellaneous operating costs. In FY 1966 was requested for this program in the five-year projections of April 1965. However, this figure has been reduced by nearly 40% to of which is for personal services, for supplies and equipment, and for other operating expenses. Program requirements for FY 1967 were estimated at in the five-year projection of April 1965. A 30% reduction has been assessed with the current budget set at the . Of this, will be expended for personal services costs, for supplies and equipment, and for other operating expenses. Although a considerable financial investment has already been made in this program, the funding allocations for imagery exploitation have not kept pace with corresponding collection programs and a serious lag is developing which endangers the success of the program to meet its assigned goals and objectives during the next several years.

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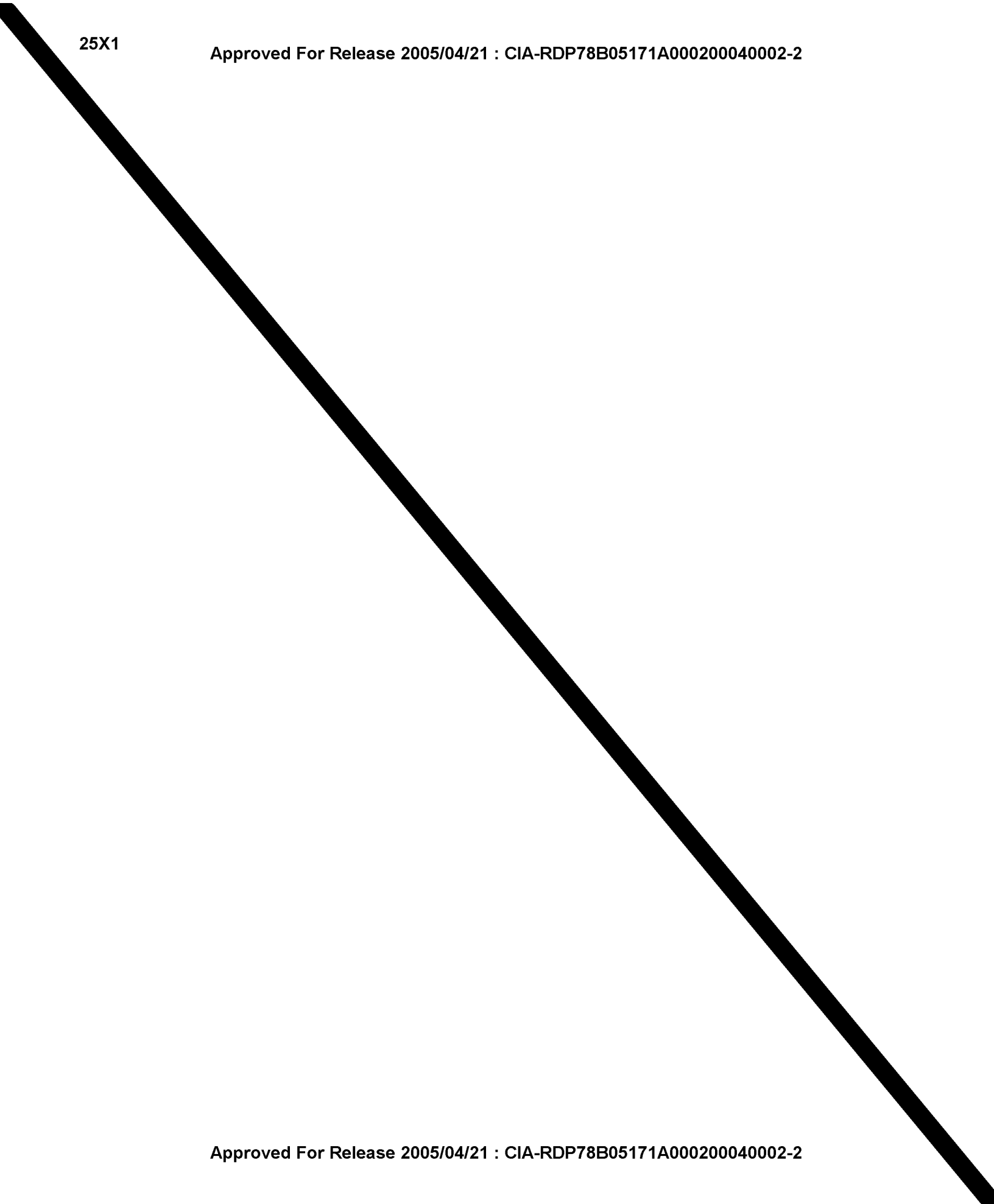

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6. NPIC Products and Services

NPIC produces a variety of products and services including reports, briefing boards, target brief listings, film reproductions, photo mosaics, scale models of various target complexes and many others. Reports, which are the major products of the Center, are categorized as immediate, detailed, technical and other. Immediate reports include a series known as OAKs which are the first-phase reports on satellite missions, and IPIRs, which are Immediate Photographic Interpretation Reports on the first-phase readout of aircraft missions.

When a mission is received, OAKs or IPIRs are produced on a daily basis until the initial scan is completed. Following the initial scan, Mission Indexes (MIs) are produced which contain a complete catalog of targets covered on a given mission. In this same time frame following the initial readout, summaries are produced listing changes in targets from previous photographic coverage. When new or significant changes are found in priority target areas, special Briefs are prepared for rapid dissemination to the Community. Order of Battle reports are regularly prepared on military facilities, radar and missile sites, and other installations of priority concern to the Intelligence Community. Following each mission, detailed analysis is undertaken as quickly as possible to meet standing requirements from USIB Subcommittees such as GMAIC, JAEIC and SIC to provide the latest information on targets in their functional areas of concern. These reports are included in loose-leaf reference books called the Black Book, Red Book, and Blue Book, which are continually updated with the latest information available. Eighty percent of the detailed reporting currently carried on is in response to standing requirements with only 20% devoted to more comprehensive detailed analysis from ad hoc requirements.

Throughout its history, NPIC has steadily increased its products and services to the Intelligence Community. The table below shows the increase during the last year of those major products which are distributed regularly to wide segments of the Community:

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Reports and Other Products	Numbers Produced CY 1964	CY 1965	% Increase or Decrease
Immediate reports	381	358	- 6%
Detailed reports	1,250	1,688	+35%
Technical reports	62	69	+ 1%
Other reports	66	48	-27%
Total reports	1,759	2,158	+23%
Mission Coverage Plots	63	90	+45%
Briefing Boards (mission only)	1,285	1,669	+30%
Photo Mosaic Indexes	1,177*	5,445	-
Target Briefs (monthly updates)	90,184	107,205	+19%

*half year only

The slight drop in number of immediate reports is the result of increased efforts by field organizations to accomplish the immediate reports from aircraft missions. Satellite missions, however, though less in number, took hundreds of times greater immediate reporting effort per mission than did the aircraft missions. And, since satellite missions have increased both in number and in length per mission, the net effort devoted to immediate reporting by NPIC tends upward.

The primary recipients of NPIC's products are CIA and DIA which account for over three-fourths of the total output. DIA further distributes the copies it receives to Army, Navy, Air Force and all other Department of Defense recipients. The figure below shows the percentage breakdown of number of copies of NPIC products as distributed to its major consumers.

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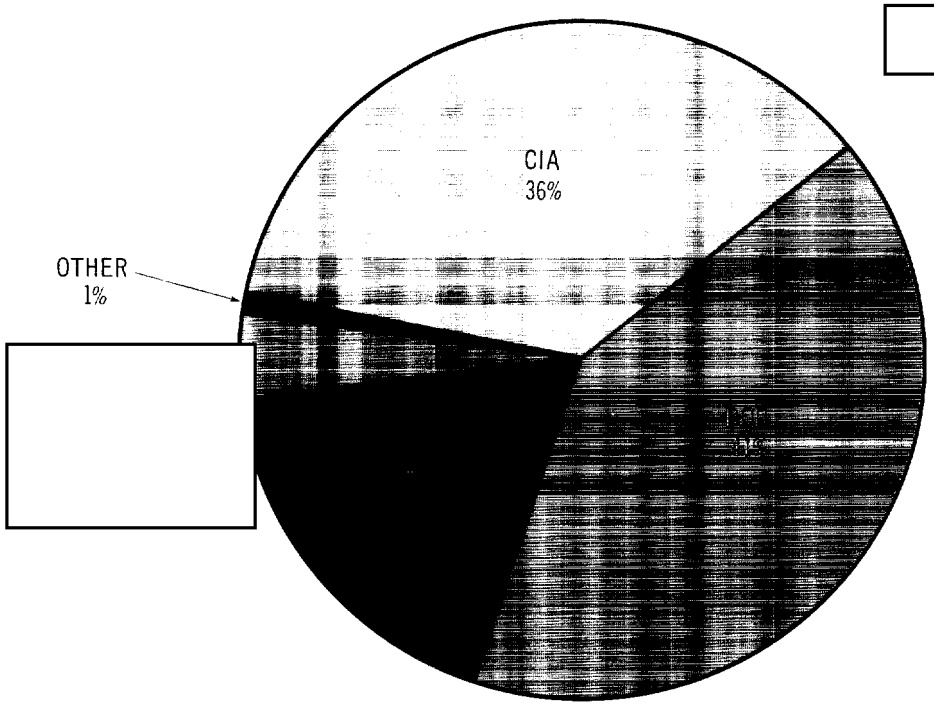

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NPIC K-6441 (3/66)

FIGURE 2. DISTRIBUTION OF NPIC PRODUCTS.

7. Accomplishments

Since the inception of the U-2 program in the summer of 1956 with the first overflights of the Soviet Union, photographic analysis has provided urgently needed information on items of priority national intelligence interest including much of what is currently known about Soviet missile test sites, missile development and production installations, atomic energy development and production facilities, the deployment of enemy military resources, size and development of industrial production complexes and many others. The program was given further impetus in the summer of 1960 with the first successful recovery of satellite photography. The ability of NPIC to derive information from this photography spurred the collection efforts with the result that nearly all of the Soviet Union and much of the world has been successfully covered. During the past ten years in which the Intelligence Community has become increasingly aware of the high yield of information from this source, NPIC has been successful in demonstrating its capability to maintain a consistently high quality performance in the face of mounting volumes of work. NPIC has scanned every foot of film delivered to it and examined as much of it as possible in depth to discover new targets and to report changes in those already identified. However, much of the film in NPIC has not been exhaustively exploited; and, in order to get the full yield of information from the photography which has been collected at such great cost, much greater time must be spent in areas of study such as industry, mining, transportation and the like.

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As mentioned earlier, the Cuban Missile Crisis of 1962 is the best-known of the Center's significant accomplishments. Although this event was of utmost immediate importance to the national security, NPIC regularly has been providing many items of information of strategic importance to the long-range security of the nation. It was at NPIC that the development of the Chinese Nuclear Test Site [redacted] was followed and which permitted the Secretary of State to publicly announce with such great accuracy their first nuclear test. During the past year preparations for a second test [redacted] were followed closely; and after the testing was achieved, the results were observed as were preparations for another test. Soviet nuclear developments were also closely observed during the past year and, [redacted] a test site was reported under construction, preparations for the test were closely followed, and the results of the test reported on.

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The missile buildup in the Soviet Union has also been intensely watched and reported on by NPIC, and, in the past 10 months alone, 112 new ICBM sites have been located and reported upon and the configuration and construction methods used by the Soviets determined. In the defensive missiles field, five new deployed and two new test range launch complexes were reported for the first time, and equipment and facilities were identified tying these complexes into other known weapons systems.

In the electronic field a total of 109 TALL KING facilities were identified, many of these directly associated with air warning facilities, and the first Soviet Troposcatter sites were discovered under construction designed to collect electronic impulses from space. There have been 10 such sites identified including one probably completed. Soviet offensive and defensive military capability is of critical importance to the whole U.S. war plan, and the above accomplishments are just some of the examples of the contributions being made by the Center.

Increasing emphasis was placed on support to the Vietnamese effort, and thousands of feet of film were received weekly of North Vietnam and South Vietnam as well as Laos, Cambodia and other areas of Southeast Asia. Particular emphasis was given to searching out the infiltration routes, the surface-to-air threat to our bombing forces over North Vietnam, and the possible introduction of surface-to-surface missiles. The first discovery of the surface-to-air missile threat in North Vietnam was made in April 1965 by NPIC photo interpreters, and in spite of the fact that photography is first read out in the field, over 60% of the 97 known SAM sites as of this date were found by the Center through repetitive searches.

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In FY 1965 film footage inputs to the Center totalled 3.1 million feet from nearly 2,000 reconnaissance missions. Inputs for FY 1966 are expected to reach 4.8 million feet from over 4,200 reconnaissance missions. Much of this input originates from tactical reconnaissance in the Far East, and inputs from the two operational satellite missions are expected to be about at the same level as they were in FY 1965. Significant production accomplishments of the National Imagery Exploitation Program for CY 1965 include:

a. 2,158 reports were produced including 358 first- and second-phase reports and 1,305 detailed reports, an increase in these categories of 15% over the previous year.

b. 338 intelligence briefings were presented to various officials of the U.S. Government and members of the Intelligence Community, and 3,554 briefing boards were prepared of which 1,669 portrayed items of immediate significance discovered on incoming missions and 1,885 supported detailed studies and briefings.

c. An exhaustive joint study of Soviet ground force installations was completed in conjunction with the CIA and DIA departmental PI elements in which the national center reviewed a total of 730 targets and produced 369 reports on these installations. Three hundred and seventy-one suspect installations were negated as being non-military in nature.

d. During the last year 4,943 new target briefs were added to the file which now includes briefs of 27,000 targets. A target brief is a consolidated write-up of all the significant known information concerning a target which is stored in a computer file and is constantly available for printout in clear English text. These briefs are updated after every new mission with any significant changes to targets that have been discovered. Every month copies of the entire file containing all of the latest information are distributed to our major customers both in magnetic tape and in printed copies.

e. NPIC provides technical support to the reconnaissance collection organizations looking toward the improvement of collection vehicles, imagery devices, and imagery media. During the current fiscal year, several new systems have been evaluated. Similarly each incoming mission from current operational satellite systems is thoroughly evaluated by NPIC in concert with the collection agencies and contractors leading to constant improvements of current systems.

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8. Major Problems

Despite major contributions made by NPIC over the past years and the increasing resources provided to the program in each succeeding year, the Center faces major problems during the next five years, most of which are beyond its control or influence. There are serious imbalances among collection capabilities, NPIC's exploitation capacity and the requirements of NPIC's consumers. In NPIC's five-year plan, prepared in April 1965, conclusive evidence was presented showing the effect on the Center of the rapidly expanding collection capability and the need for greatly increased resources to cope with the mounting inputs from new systems providing increasingly greater volumes and higher quality imagery. Also pointed out in this study was the need to study the impact of this information explosion on the analytical community and to consider the ability of the Intelligence Community to absorb the increased outputs from the Center.

To study these problems the Bureau of the Budget requested the Secretary of Defense and the Director of Central Intelligence to review the U.S. Government photographic intelligence capabilities. This study which is being undertaken by a Joint Imagery Interpretation Review Group got underway in October 1965, and its results are not due to be published until June 1966. One of the major objectives of this study is to make recommendations concerning the division of labor or sharing of responsibility for imagery exploitation among the various government agencies involved. The problem of overlap of responsibility among various government agencies is also being looked at. The results of this study will have great significance to the national center and the National Imagery Exploitation concept, and until it is published, many of the problems raised by the Center's management one year ago are being held in abeyance.

While the problems of how to handle the Imagery Exploitation Program are being debated in the Community, developments and improvements in the collection programs continue to move ahead. In response to the requirement laid down by the USIB, the National Reconnaissance Office has scheduled 12 KH-4 missions for FY 1967; and to ensure that this requirement is met, 6 vehicles are being planned for a reserve, ready for use in case the primary mission fails. Thirteen successful KH-7 missions are being planned for [redacted] 25X1 25X1 The number and types of photographic reconnaissance missions is determined by the Committee on Overhead Reconnaissance (COMOR) a committee of USIB, and considerable attention is given by that Committee to the scheduling on the basis of availability of launch vehicles, phasing

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of the launch readiness cycle, and the overriding military requirements. As pointed out by the CIA Inspector General's report of June 1965, there is no evidence that consideration is being given to the imagery exploitation capability to handle the inputs from these missions. The resulting workload from the input of these systems for this year and succeeding years will be staggering, and it is evident that personnel are not being added fast enough to handle this workload.

Some progress has been made during the past year however. A streamlined personnel recruitment effort has been established and increasing numbers of personnel are being obtained through a national advertising program and direct recruitment efforts on behalf of the Center. By the end of FY 1966 it is expected that [redacted] people will be devoted to the National Imagery Exploitation Program. A cooperative training program is being designed in which qualified college students in various technical fields of interest to the Center will alternate from the classroom to the Center for work. This program is scheduled to be instituted early in FY 1967. Other training programs are being designed and existing ones greatly expanded to handle the expected influx of personnel. Building planning is getting underway to provide the necessary space to handle the expanded facility although it is expected that construction will not commence prior to FY 1968.

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From an organizational standpoint, it is considered desirable to consolidate all NPIC/CIA imagery interpretation assets under the present national concept making adequate allowances for CIA and other departmental imagery interpretation support from NPIC. A proposal for such a reorganization was made by NPIC's management in the fall of 1965, but has been deferred by higher authority pending completion of the JIIRG study.

NPIC was originally chartered for the purpose of ensuring effective, timely and economic exploitation of photography. Because of the great expense to the U.S. Government in terms of personnel facilities and equipment, the provision of a national center as a service of common concern is seen as the most economic means of carrying out national exploitation of photography required by growing potential in collection systems. This national and centralized concept is still valid and more pertinent than ever before. To prevent the proliferation of exploitation components throughout the government with the dangers of overlapping and uncoordinated responsibilities, a strong and adequately equipped Center must be built and maintained. The guiding principles and responsibilities of the national center as stated in NSCID #8 should be reaffirmed and some instances clarified to permit the continued development of a national center concept.

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9. Cost Savings Program

In managing the National Imagery Exploitation Program, NPIC has continually sought improved efficiency of operations and more productive and effective uses of personnel. Starting in FY 1966, a new long-range exploitation program was instituted which provided for the consolidation of certain phases of the production process and the more effective utilization of the personnel available. As a measure of progress being made in this endeavor, NPIC's management utilized the Management Information System to make specific determinations of manpower being utilized in the immediate exploitation phase. One of the manpower indices used is known as the "Manhour per foot of film factor", and the Center has sought to reduce this factor wherever possible. However, savings achieved in the production process have tended to be offset by improved quality of film calling for greater expenditures of manpower in order to provide necessary exploitation.

25X1 During FY 1965 the immediate exploitation of KH-4 photography cost NPIC an average of [ ] manhours per foot of film. By streamlining reporting procedures, automating additional functions and acquiring more productive and sophisticated equipment, the Center sought to reduce this factor by 10%. Actual experience however proved that the factor could be reduced only to [ ] manhours per foot of film, which resulted in approximate savings of [ ] 25X1 25X1 during the first half of FY 1966. The principal reason that the savings goal was not achieved was that the targets covered per mission were running at twice the rate covered on an average mission during FY 1965. In the KH-4 system the trend toward improved resolution and increased target coverage is seen to be continuing for the life of the system; and therefore for estimating purposes, no further reduction in the manhour per foot of film purposes, no further reduction in the manhour per foot of film factor is contemplated for FY 1967. The same holds true for the KH-7 system in which experience shows that the manhour per foot of film factor is continually rising, largely due again to improved resolution and increased target coverage. Had the Center used its FY 1965 experience, however, in projecting its manpower needs, costs would have been 25X1 [ ] over that estimated in these latest projections.

A second major factor effecting the five-year projections of the Center's requirements are the film input estimates. In order to obtain the most accurate and up-to-date scheduling of mission inputs, NPIC requested the National Reconnaissance Office to furnish it with the number of satellite mission launches and the footages to be obtained during the FY 1966-1972 period. To determine the number of successful missions that will result from these launches, NRO

recommended that we plan on an 80% success factor for KH-4 missions. This was done in this planning exercise. In estimating the film footage from satellite systems, only operational footage was reflected, i.e., the volume of film which covers foreign areas and which must be exploited. Percentage reductions in the footage per mission figures supplied by NRO were made by NPIC to make them more realistic with comparable inputs experienced. Specifically, a 20% reduction in the KH-4 figures was made and a 30% reduction of the KH-7 [redacted] figures. If 25X1
the NRO figures for number and film footages had been utilized as the basis of planning projections, National Imagery Exploitation costs in 25X1
FY 1967 would have been [redacted] over that requested in this projection.

Other reconnaissance collection systems are under development which may have a direct impact on the production capability of the Center during the FY 1967 period. However, to date NPIC has been unable to get necessary data relative to the operational scheduling and the volume of materials from these systems and, therefore, no provision has been made in these estimates for exploitation of these systems. The types of collection systems referred to here are [redacted] 25X1
25X1 [redacted] light balloon, real-time readout satellites, advanced high-level aircraft and new low-level multi-sensor aircraft systems.

In addition to improving the imagery exploitation process wherever possible, several other management improvement programs have been vigorously pursued. Noteworthy among these is a Records Management program, which was formally instituted in April 1965. A complete inventory was made of all NPIC records including paper and film holdings, and a Records Control Schedule established providing for the orderly retirement and disposition of these materials. In the first nine months of this program, 4,075 cubic feet of material was destroyed, and an orderly program established for movement of no longer used records to the Agency's Records Center. In addition, provisions have been made for the regular destruction of extra copies of film and the transfer of surplus photography to to other Intelligence Community components who have a stated need for this material. Estimated dollar savings from this program for its first nine months of operation run to [redacted] 25X1

An active Employee Suggestions Program is pursued by the Center's management in order to capitilize on ideas of all employees for savings in production procedures. During FY 1965, 42 suggestions were submitted for consideration of which 13 were adopted for use netting
25X1 [redacted] in tangible savings in Center operations.

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B. Information Processing and Exploitation - CIA Departmental Imagery Exploitation

1. General

Support to CIA departmental requirements is provided by the CIA/Imagery Analysis Division (CIA/IAD). This activity is responsible for producing departmental imagery intelligence in support of CIA activities through analysis of photography and other image forming sensors. Special emphasis is given to supporting CIA clandestine activities through the provision of personnel and special services both at headquarters and abroad. CIA/IAD also provides assistance to CIA requesters seeking support from NPIC by helping to formulate requirements and by providing a channel for receiving, processing and activating requests for national imagery intelligence support and services. CIA/IAD is also responsible for providing qualified imagery analysis personnel, key managers and operational support personnel to the NPIC Photographic Analysis Group as part of the CIA contribution to the national effort.

The CIA Departmental Imagery Exploitation Program is carried out in the CIA/Imagery Analysis Division with supporting services from NPIC. The resource requirements reflected in this section consist only of those elements of CIA/IAD and NPIC that are involved in CIA Departmental Imagery Exploitation. Not included are the personnel, equipment and other support provided to the NPIC Photographic Analysis Group by CIA/IAD as part of the CIA contribution to the national effort. Both the national and the CIA departmental imagery exploitation programs are under the executive direction of the Director, NPIC

2. Historical Origins of the Program

The National and CIA Imagery Exploitation Programs share their origins, and it was not until later years that organizational arrangments were made emphasizing distinctions in these two programs. The original PI effort established in ORR in 1952 was essentially a departmental one, and it was not until the creation of HTAUTOMAT in 1956 that the program took on national aspects. At that time military PI units from Army, Navy and Air Force were invited to jointly participate in the exploitation of the eagerly sought U-2 photography. With the formal chartering of NPIC in 1961, the distinction between national and departmental programs came more clearly into focus.

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A CIA Photographic Intelligence Division was formed at that time and, although continued support was given to CIA requesters, particularly the clandestine services, the major portion of the efforts of that division were devoted to national work in conjunction with military PI's working in ad hoc teams. This arrangement continued until the spring of 1963 when the NPIC Photographic Analysis Group was first organized. NPIC/PAG was the first formal organization of national imagery exploitation efforts in which half of the staffing was provided by DIA and half provided by CIA on detail from its Photographic Intelligence Division. By formally separating these two elements CIA/PID, which was later renamed CIA/Imagery Analysis Division, was left free to concentrate its full efforts to satisfying essentially departmental requirements of CIA offices and activities.

The problem of distinguishing responsibilities between national and departmental exploitation activities is currently under study by the Joint Imagery Interpretation Review Group. Although there have been certain advantages and disadvantages in maintaining the organizational identities of CIA/IAD and the national center, the Director, NPIC has concluded that the consolidation of NPIC and CIA/IAD within the national center concept warrants serious consideration and has proposed a reorganization to merge these two components. Because of the pending JIIRG study, the Director, NPIC was advised to defer any plans for reorganization until the study was completed and pertinent information and recommendations appropriately assessed. Accordingly, organizational planning concerning NPIC and CIA/IAD are awaiting the completion of the JIIRG study.

3. The CIA Departmental Production Process

The CIA Departmental Imagery Exploitation Program is designed to provide direct support to CIA elements through the production of departmental level imagery intelligence and provision of imagery intelligence services using all types of photography or other imagery. Analysis efforts are carried out on a world-wide basis with primary emphasis in the functional fields of atomic energy, chemical-biological and radiological warfare; military equipment, installations and deployments; geographic studies including terrain analysis; missiles and electronics; and industrial studies including analysis of transportation facilities.

Workload in the CIA Departmental Imagery Exploitation Program originates with the initiation of requirements from CIA components both at headquarters and in the field. Typically, these requirements call for detailed analysis of specific areas or installations or other targets of prime concern to be used in the preparation of

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finished intelligence or planning of intelligence operations. The major portion of this effort is carried on in the headquarters area in the [redacted] complex, but [redacted] In addition, CIA/IAD personnel have given imagery analysis briefings to numerous officials within the U.S. Government as well [redacted]

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4. Funds and Tangible Resources

CIA/IAD's tangible resources consist almost exclusively of imagery exploitation equipment and the office space in which it is housed. The current value of its equipment inventory is approximately [redacted] with an additional $ [redacted] scheduled for procurement during the last half of FY 1966. In FY 1967, procurement levels for technical equipment are expected to rise to approximately [redacted] if departmental requirements are to be met. The magnitude of this expenditure reflects estimated inputs of film as well as the expanded manpower requirements for that year.

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CIA/IAD presently occupies a total of 28,500 square feet of office space in [redacted] By being collocated with the national center, CIA/IAD has available to it all NPIC supporting services including report reproduction; photo lab facilities; mensuration services; computer support; extensive collateral facilities; and CIA administrative support involving personnel, logistics, security, travel and training services.

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5. Manpower Resources

Manpower resources available to the CIA Departmental Imagery Exploitation Program are shown in Tab 4 and were derived from the NPIC Management Information System, in which CIA/IAD participated, as well as other production records of the division. On the chart the total manpower requirements for the program are shown in the column entitled "CIA Departmental Imagery Analysis" and consists not only of manpower from CIA/IAD but also those portions of the national support division efforts that are needed to support this program.

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given to fulfilling the manpower requirements of the national center first. CIA/IAD is being allowed, however, to exceed its ceiling in order to bring aboard and train new PIs for eventual assignment in the NPIC Photographic Analysis Group.

Because of these manpower limitation, backlog has risen sharply in the departmental area. In order to handle the expanding number of requirements as well as to make some headway in depleting the

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6. CIA/IAD Products and Services

The major users, consumers and beneficiaries of the CIA Departmental Imagery Exploitation Program are the three substantive directorates in CIA, namely DDI, DDP and DDS&T. Special emphasis is given in CIA/Imagery Analysis Division to providing tailored products to meet the specific needs of components throughout the Agency. Many CIA requests are answered by means of informal memos (IOM's). However, the formal photographic intelligence report (PIR) is the vehicle by which CIA/IAD imagery analysis is disseminated throughout the Agency and also to other interested recipients in the Intelligence Community. Shown in Figures 3 & 4 respectively are the CIA/IAD Imagery Analysis manhours expended in support of the various CIA Directorates and by subject category.

As a result of requests for more detailed reporting as well as increased demands for copies of CIA/IAD reports from existing and additional consumers, there was a shifting of emphasis at the beginning of Fiscal Year 1966 from the production of IOM's to PIR's. PIR production has thus increased from a total of 37 through the first seven months of FY 1965 to a total of 923 for the same period of FY 1966. Standard distribution for these finished detailed reports from CIA/IAD are as follows:

ACTIVITY	NUMBER OF COPIES
CIA	36
DIA	51
NSA	1
U.S. Navy	3
U.S. Army (SPAD)	1
ACIC (Detach.)	1

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ACTIVITY	NUMBER OF COPIES
AMS	1
SAC	2
[redacted]	4
	10
Total	110

7. Accomplishments

In responding to CIA departmental needs, CIA/IAD has provided increased support and services on a wide range of subject and area specialties reflecting high priority Agency interest in photography as a prime source of information. Higher quality film inputs were received with greatly improved resolution resulting in increased complex requirements for interpretation. Primary emphasis in CIA/IAD was placed on achieving higher production goals and increased quality of reports to meet the needs of an expanding number of consumers. These reports have provided operational planners, intelligence analysts, mapping and targeting personnel with a major source of unassailable information that contributes materially to the improvement or success of intelligence analytical efforts and clandestine operations.

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[redacted]

Extensive effort was devoted to the recruitment and training of additional PI personnel to support the departmental effort as well as to provide the PI manpower pool for the CIA contribution to the NPIC Photographic Analysis Group. CIA/IAD assigned [redacted] persons to NPIC/PAG in FY 1965 including [redacted] Imagery Analysts, and the recruitment effort was stepped up to provide for the additional assignments in FY 1966 and FY 1967. Training programs were developed to provide basic levels of competence for PI personnel, and technical training was provided to experienced PI's to increase their capability to handle higher resolution photographic inputs as well as related

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8. Program Problems and Handicaps

The Director, NPIC serves in a dual role in which he provides direction for both the national and the CIA departmental imagery exploitation programs. Careful attention is given to the proper allocation of resources between these two programs but customarily when the two activities are competing for limited resources priority must be given to the national effort. Personnel, funds and space, therefore, have been restricted to levels well below those required to meet the existing and impending workload of CIA/IAD. Indicative of these shortages are some of the following problems and handicaps:

a. Available building space for the departmental area is fast diminishing despite intensive efforts to make optimum use of existing facilities.

b. The flow of recruiting is abruptly altered by fluctuations in T/O and budget authorizations.

c. The need to provide training programs for new PI personnel siphons off experienced imagery interpreters already in short supply.

d. CIA/IAD is totally dependent on NPIC for all major support services and normally receives their work after national commitments have been met. Although NPIC makes every effort to fulfill the support requirements of the departmental effort, personnel limitations in the national area do not permit the provision of the full level of support required.

9. Efficiency/Cost Savings

During FY 1966 CIA/IAD has improved management and efficiency of its operations through the following changes:

a. Reassigning personnel to achieve maximum use of skills and administrative effectivemess in critical production areas.

b. Installing advanced mensuration devices to reduce response time on mensuration tasks.

c. Destroying nonessential files to reduce storage costs.

In FY 1967 the division will vigorously pursue cost reductions in order to make maximum use of its limited resources. Operating procedures will be streamlined wherever possible; existing systems for PI reporting and related support and services will be simplified; and staggered work hours will be tried on a limited basis to provide uninterrupted production time in those areas where it is found to increase effectiveness without additional cost.

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C. Information Processing and Exploitation - ADP Systems

1. General

Center ADP activities may be divided into four major categories: computational services, information storage and retrieval services, report generation services, and management information services.

Computational services are largely provided by the Photo Measurement System. This system has evolved from the Center's commitment to use the procedures of analytical photogrammetry for the determination of precise metrical information about entities imaged on the photography under study. The analytical, rather than instrumental, approach to these photogrammetric problems has permitted almost unlimited flexibility in type of photography from which metrical information can be obtained; it has also imposed computational requirements which could not have been met without the use of stored program digital computing equipment.

The Photo Measurement System involved reduction of time, attitude, and position information to obtain parameters for each frame of photography necessary for distance, direction, and position computations. The pre-processing programs are completed and operational for reducing attitude information from the horizon attitude cameras and binary time on the KH-4 satellite reconnaissance system. Similarly, programs are available for obtaining this data from a new aircraft inertial navigation system. Programs are being developed to handle the KH-7 satellite reconnaissance system. Orbital position information for the KH-4 can now be computed, and a similar capability for the KH-7 is being refined.

Once frame or index parameters have been determined for the system, Center photogrammetrists and photo interpreters can employ this data when making measurements. The necessary programs exist for offline processing of data from comparators and for online real-time processing of data from the [redacted] dual screen comparator, the [redacted] 25X1 25X1 film reader, and the [redacted] chip comparators. The online system may be used to determine distances, azimuths, geo-coordinates, and areas. Programs to permit plotting of imaged points are also available.

"One-time" computational services are provided as the need arises, with programming performed by IPD or by the requesting component on a "job shop" basis. A FORTRAN compiler is maintained by IPD for such services.

Information storage and retireval services are currently provided by three major systems and numerous minor systems. The major systems are: Target Brief System, All-Source Document Index System, and Minicard Document Storage System.

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The Target Brief System is designed primarily to provide target-oriented background information for use in the immediate exploitation of imagery inputs to the Center. The system was introduced in 1957, with background information stored on punched cards and listings prepared on EAM equipment. In 1962, the system was converted to run on an IBM 1401 computer, using magnetic tape as the storage medium. The system is currently being converted to run on the UNIVAC 490/494 computer configuration, with program modifications to improve file maintainance and to provide more selectivity in file listing. The Target Brief File has grown through the years to where it presently comprises information on approximately 27,000 targets in 92 countries.

The All-Source Document Index System, through its daily accessions listings and published quarterly reports, provides acquisitions notification for all new imagery-derived reports received or published by the Center. Cross referencing by subject and title variation and other categories allows quick retrieval in a variety of reference ranges to meet specific needs or standing requirements. Like the Target Brief System, the All-Source Document Index System was initially an EAM system which was later converted to the 1401 and more recently to the 490.

The Minicard Document Storage System provides a store of 16 millimeter chips of all formal PI reports received by the Center, of informal reports produced by the CIA Imagery Analysis Division and the DIA photographic interpretation component, and of KH-4 and KH-7 mosaics overlaid on WAC charts for use in determining coverage of specific areas. In-depth coding and file expansion afford considerable flexibility in retrieval of information from the system. The original concept of the Minicard system envisaged the storage and dissemination of imagery collected by the U-2 reconnaissance system; however, the system has never been used in this respect.

Other information storage and retrieval services in current operation include an automated Library Circulation Control System which utilizes circulation control cards to produce accountability listings and overdue notices, and a family of computerized files which provide specific order-of-battle information and related statistics.

The major endeavors in systems analysis involving information storage and retrieval will be completed during FY 1967. The first involves the analysis and design of an NPIC interface with the Community Online Intelligence System (COINS). The second involves a detailed analysis of the present NPIC substantive data base and of current and projected requirements against the data base; the analysis will result in development of a conceptual framework and design

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specifications for an Integrated Information System (IIS). The analysis will be the first phase of a four-phase program leading to implementation of an IIS. It is anticipated that Phase II (System Design) will be underway by the second quarter of FY 1967 and completed during the last quarter of FY 1967.

Report generation services have been directed primarily at the "immediate" PI reports, and are aimed at providing a capability for: accepting target information at random during the reporting cycle, ordering the information into a meaningful sequence immediately upon conclusion of the reporting cycle, and preparing multilith mats for reproduction of the information with a minicard time lapse; automatic creation of paper tapes for those reports which must be disseminated by cable as well as being published; and, capturing of target information in machineable form to facilitate incorporation of the information into the substantive data base.

Historically, report generation computer programs have been subjected to continual modification to meet refinements deemed desirable by the producer or recipient of the reports. During FY 1967 a study will be made to determine the feasibility of using a generalized report generator program for production of the various immediate reports.

Management information services are provided by the Center's Management Information System (MIS). This system, which utilizes the 1401 computer configuration, accounts for the progress of projects through NPIC and for the allocation of resources within NPIC; it forms the basis for NPIC management, review and projection of NPIC future requirements. The MIS has performed well as a pioneer effort in providing management information (work was begun on the system in FY 1962, and it was put into operation during FY 1964). There are, however, a number of refinements and modifications needed in the MIS to make it more responsive to management needs and to reduce the effort presently required in computer program maintenance.

During FY 1967, the Center's MIS will be converted from the 1401 to the 490/494 computer configuration. This transfer, coupled with the introduction of some programming innovations, will significantly reduce processing time on the MIS.

2. Production Process

Center ADP activities are the responsibility of the Information Processing Division (IPD). The Division is organized functionally into 3 major areas: Systems Analysis, Programming and Operations.

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Ideally, requirements for ADP support either originate in or are brought to the attention of the Systems analysts who conduct detailed analyses and prepare designs for ADP systems. Design specifications are used by the programmers for the planning, programming and checkout of computer programs required by the system. Computer run manuals are prepared by the programmers and used by the operations people for actual running of programs.

Scarcity of manpower resources in the Systems Analysis and Programming areas has prevented rigid compliance with the above procedure. Systems work has suffered notably, and much of the systems work has necessarily been done by programmers. It has also been necessary to supplement both the Systems Analysis and programming work by contractual support.

3. Funds and Tangible Resources

Major ADP hardware used in NPIC consists of a UNIVAC 490 Real-Time Computer Configuration, and IBM 1401 Computer configuration, and a MINICARD system.

A variety of EDP and EAM equipment is employed is support of the 3 major configurations.

The major application on the UNIVAC 490 computer has been the real-time Photo Measurement System and related computational programs. The IBM 1401 computer has in the past handled the bulk of the batch data processing activities (Target Brief System, Management Information System, etc.) and report generation services. A concerted effort is being made to reprogram 1401 applications for the 490 to alleviate the workload on the 1401 and, ultimately, to eliminate the need for the 1401. To date, the All-Source Document Index System and portions of the Management Information System have been converted to the 490, and programming is well along on converting the Target Brief System to the 490.

During the third quarter of FY 1967, the IBM 1401 computer and associated equipment will be phased out, and during the second quarter the UNIVAC 490 computer will be upgraded to a UNIVAC 494 computer. Other major hardware changes anticipated during FY 1967 include:

a. upgrading of Uniservo magnetic tape drives to provide a higher information transfer rate and to allow denser packing of information on tapes, and

b. addition of a second 494 CPU with 32K memory.

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The above changes are considered essential if NPIC is to:

a. provide photo interpreters with continuous online real-time support required to meet increasing commitments;

b. improve the efficiency of computer systems currently operating on the IBM 1401 and UNIVAC 490; and,

c. participate in the Community Online Intelligence System (COINS).

To accomplish the desired changes in ADP hardware, a substantial increase in funding for equipment rental is required (from [redacted] during FY 1966 to an estimated [redacted] during FY 1967). However, the estimate is thirty per cent under the FY 1967 projection of [redacted] made during FY 1965, the reduction being attributed to: 25X1 25X1 25X1

a. downward revision of computer extra-shift rates in the FY 1966 GSA contract;

b. economies resulting from replacement of certain EAM and cummunications equipment with less costly but equally effective equipment; and,

c. slippage in the scheduled installation date of the UNIVAC 494 computer (initially scheduled for the last quarter of FY 1966).

The 1965 estimate for General Equipment for FY 1967 has been increased by [redacted] This reflects the need for additional off-the-shelf terminal equipment (teletypes, displays, etc.). 25X1 25X1

[redacted]

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5. ADP Products and Services

All elements within NPIC and a number of elements outside NPIC have benefited from the Center's ADP services. Major services may be summed up as follows:

a. Computational Services - The Photo Measurement System provides the photo interpreter and the photogrammetrist with an on-line capability to derive precise measurements of a complex nature from satellite and suborbital imagery. These measurements are in turn reflected in NPIC reports on a wide range of targets and contribut immeasurably to a proper evaluation of the significance of these targets.

b. Information Storage and Retrieval Services - While the Target Brief System was originally conceived to provide photo interpreters with background target information for use during mission scans, the Briefs have found wide acceptance as an analytical tool throughout the U.S. Intelligence Community. Among the many recipients of the Target Briefs outside NPIC is the Committee on Overhead Reconnaissance (COMOR), which uses Target Brief information in planning imagery collection activities. The All-Source Document Index System provides an up-to-date bibliography of imagery derived reports which is distributed throughout the U.S. Intelligence Community for use as a reference tool. The Minicard Document Storage System is primarily for use by photo interpreters and analysts within NPIC; however, Minicard chip holdings have been exchanged with DIA and SCA, each of which has a Minicard System.

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c. Report Generation Services - PI reports produced with the aid of ADP equipment are disseminated throughout the Intelligence Community in hard copy and/or cable form. These reports are in partial response to priority national requirements set forth in NSCID #8.

6. Accomplishments

Major ADP accomplishments at NPIC may be summed up as follows:

a. Computational Services

(1) The operational on-line photo measurement system was substantially upgraded to incorporate new segments for a new type of on-line equipment and automatic retrieval of any one of 20,000 prestored frame parameters. As demands for the use of this system increase, additional equipment or the same type can be put on the air without program changes. A detailed system study has been completed to incorporate future collection systems and to enlarge the storage of frame parameters to 100,000.

(2) To support the on-line photo measurement system for the KH-4, a complex series of data reduction computer programs was completed. This file is available to the Intelligence Community, and is presently being sent to FTD.

(3) The problem of developing the programs for new collection systems has caused IPD to go far-afield to learn and understand other functions outside of exploitation. The demands of the new aircraft collection system have been met with full computer support to reduce inertial navigation system data to usable frame related data.

(4) Not all IPD's mathematical effort has been expanded on large collection systems. An eighty-page mathematical table has been generated for our R&D effort. Also developed was a comparator operator error analysis program to support the R&D efforts.

b. Information Storage and Retrieval Services

(1) Redesigning and programming of the Target Brief System will be completed during the last quarter of FY 1966 and will be installed in the first quarter of FY 1967. The revised system will result in significant time savings in updating, maintaining and retrieving of target data from the Target Brief File.

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Additional programming effort will aid in greater selectivity of Target Brief Information. This selectivity will further reduce computer time and colume of printout.

(2) Installation of a 1004 data link has facilitated receipt of mission data vital to the immediate exploitation of reconnaissance imagery. Not only is the data received much more quickly, but it is received in computer-readable form permitting further processing without human manipulation.

(3) Computer selection of COMOR targets which are covered by a particular reconnaissance mission has drastically reduced the need for costly and time-consuming manual selection of these targets.

c. Report Generation Services

(1) Significant progress has been made toward source-data automation by using 826 Typewriter Card Punch machines in the preparation of immediate PI reports, eliminating a keypunch/verification step. As a result, we have substantially reduced our estimates of the number of keypunch operators required for future years. Computer programs are operational to accommodate 826-derived information for OAK reports, IPIR's and Mi's.

(2) In direct support of NRO, a computer-oriented system for the selection of KH-7 coverage is being produced and sent to NRO for their pre-mission planning.

d. Management Information Services

NPIC's Management Information System was the first in CIA to be computer-oriented. It provides a factual record of the allocation of the Center's resources to specific tasks, affording a statistical base from which to project future requirements.

7. Major Problems

The most serious problem confronting NPIC's ADP effort is the shortage of trained systems analysts and programmers. The shortage of systems analysts has been especially critical, with the result that a thorough analysis has not always preceded the programming and implementation of a system. In an effort to combat the problem the Center has engaged in an intensive recruiting drive, including the placement of advertisements in newspapers from coast-to-coast. Initial response to the recruiting drive has been heartering, and it is hoped that a

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number of the respondents will actually be hired during FY 1967. Continued efforts along this line could result in adequate staffing by FY 1970. Intensive in-house training programs have been instituted for programmer and systems analyst trainees. Precise methodology and procedure standards have been developed and have significantly assisted in training new programmers.

To augment the Center's systems and programming resources, it has been necessary to solicit contractual help on the more complex systems. It is anticipated that increased emphasis will be placed on contractual support during the next few years (i.e., until the Center is adequately staffed).

Another major handicap in the past has been the inadequacy of communication between the developers of collection systems and those who will be required to exploit the materials collected. This has resulted in undue delay in developing ADP systems needed for effective exploitation. This problem was recognized by the Inspector General's Survey of NPIC in 1965, which recommended that the Deputy Director for Intelligence provide "for the establishment for each reconnaissance system in existence or under development, an NPIC design team (composed of photogrammetrists and computer programmers as well as representatives of the NPIC Plans and Development Staff) to work on a continuing basis with, and have direct access to, design specialists in NRO and in contracting manufacturing firms". One such design team has been established on an ad hoc basis for one new collection program with favorable results to date.

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D. Research, Development, and Engineering - Production/Information - Imagery Exploitation

1. General

The National Photographic Interpretation Center is responsible for conducting an active program of technical development in equipment and techniques for the purpose of improving and advancing exploitation of photography and other imagery in support of the national effort. The development of new systems, instruments, materials, and devices for photographic exploitation includes a wide range of optical-mechanical and electronic instrumentation as well as the application of automated systems for the extraction of data from photographic and related materials. In addition, the Center provides technical advice and support to Agency and government components responsible for the development of new image-forming collection systems and coordinates its research and development activity with interested elements of the Intelligence Community for their own possible use or further adaptation.

The Imagery Exploitation research and development program as carried out by NPIC is comprised of the resource requirements of the Plans & Development Staff and includes personnel requirements, equipment needs, as well as funding requirements for external research contracts. Not included in this section are the requirements for the maintenance function which is also administered by the Plans & Development Staff. Also no provision has been made in this submission for any possible requirements of the Office of Research & Development, DDS&T, although continuing liaison is maintained to keep that office fully apprised of NPIC's actions and objectives in this field.

2. Origins of the Program

The imagery exploitation research and development program first came into being in 1956 with the establishment of Project HTAUTOMAT. One of the primary goals in the establishment of that organization was to provide the photo interpreter with all forms of support necessary to ensure proper performance in his job. One of these forms of support included the development of specialized equipment specifically designed to meet the special needs of the photo interpreter and the supporting services surrounding him. To be most effective, direct and close contact with the working elements by the developers of equipment was deemed to be of the utmost importance, a concept which remains true today.

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In the early days of the program, funding resources were extremely modest and only two or three people could be devoted to this effort from the meager personnel resources available to the Center. Most of the funds devoted to the program were obtained from corresponding collection programs or surplus funds from operating components in other parts of the Agency. In the initial stages of the program, equipment design and specifications were most frequently geared to specific collection systems but as the instrumentation became more expensive and complex, increased efforts were put into designing multi-purpose equipment to handle a variety of formats from a number of different collection systems. A formal Development Staff was not organized in the Center until 1960 at which time [ ] 25X1
25X1 [ ] were earmarked for external research contracting. By 1964 the Staff had grown to 30 people and was expending [ ] in 25X1
development work through external contracting. From the beginnings of this program, close coordination and cooperation with military elements was stressed and the Center took the lead in promoting joint procurement programs of like equipment in order to realize savings through volume buying.

The Imagery Exploitation research and development program was given formal recognition on a Community-wide basis in 1961 at the time of the issuance of NSCID #8. Within this Security Council Directive under the section of NSCID #8 dealing with centralized responsibilities, NPIC was directed to "engage in or sponsor as appropriate the development of specialized equipment for the intelligence exploitation of photography and ... provide information about such specialized equipment to interested elements of the Intelligence Community for their own possible use or further adaptation." This is the basic authority under which the program operates today and is the guideline for its continuing operation. Since 1961 the program has continued to expand and develop reaching a high funding
25X1 level in FY 1964 when [ ] was expended on external research contracts. Since then the program has suffered from decreasing funding allocations caused by budgetary restrictions on the over-all National Center in which the research and development program offered the only flexible item that could be reduced after all operating expenses had been pared.

3. Objectives of the Program

In carrying out the responsibilities assigned to the Center by NSCID #8, the following general objectives have been established for the Imagery Exploitation R&D program:

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a. Maintain a comprehensive program designed to make possible the optimum exploitation of current and projected inputs.

b. Through automation, hold down the burgeoning manpower requirements and increase the efficiency and techniques for the most rapid extraction of intelligence and technical information from these inputs.

c. Maintain responsiveness to technological and scientific advances in or applicable to the field of imagery exploitation.

d. Improve collection and coordination of information on collection systems in order to develop proper exploitation equipment and techniques.

e. Promote and coordinate imagery exploitation R&D activities throughout the Intelligence Community in an effort to effect savings through joint development and procurement.

f. Achieve more effective management by organizing research and development efforts into a coherent program.

4. Operation of the Program

Responsibility for carrying out this program within NPIC is vested in the Plans & Development Staff. Within the Staff the program is generally carried out in four phases including a technical planning phase, a development phase including formulation of objectives and monitoring of contracts, and a test and evaluation phase. All of these efforts are supported by a small exploratory development laboratory. Orientation of the program is towards specific current and future requirements, and the Plans & Development Staff carries out its responsibility through identifying these requirements, establishing specifications, letting and monitoring contracts, testing and evaluating equipment and procedures, and supervising and training operators on new equipment and procedures.

The goal of maximizing cost effectiveness through coordination with other agencies is achieved largely through the National Committee on Photographic Exploitation Equipment (COPE), chaired by NPIC and through the Inter-service Coordinating and Integrating Group (ISCIG). This effort is being vigorously pursued and significant gains have been made in this area within the past year.

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5. Funds and Tangible Resources

Tangible resources for this program consist almost exclusively of special purpose equipment and office space within [redacted] 25X1
About [redacted] square feet are currently allocated to this program of 25X1
which over [redacted] are used for a special purpose exploratory development laboratory and an area for test and evaluation of equipment. 25X1
The equipment associated with these supporting functions includes a complete optical laboratory, a clean room facility, mechanical test and evaluation equipment and an experimental photographic laboratory. The total value of this special purpose equipment is about [redacted] 25X1

As mentioned earlier, funding has been a major problem with this program. In FY 1965 slightly over [redacted] was expended including 25X1
[redacted] for external contracts with the remaining funds for 25X1
personal services, equipment, and other operating expenses. In the preparation of the five-year program in April 1965, [redacted] 25X1
was requested for this program in FY 1966. However, current allocation has been reduced to slightly more than [redacted] of which 25X1
[redacted] is for external contracting and the balance for other 25X1
operating expenses of the program. Current budget authorization for FY 1967 calls for a total expenditure in the program of [redacted] 25X1
of which [redacted] will be for external research and the remaining 25X1
[redacted] for personal services, equipment, and other operating expenses. 25X1
Since the FY 1966 program was funded at a level well below one-half of that requested, it threw the program out of phase and in FY 1967 it now appears that [redacted] million represents a realistic funding level. 25X1
This is a [redacted] increase over current approved levels. This is 25X1
primarily due to an expanded requirement for additional manpower resources as well as a modest increase for some additional external contracting.

6. Manpower Resources

Manpower resources available to the imagery exploitation R&D program are shown in Tab 4. On the chart the total manpower requirements for the program are shown in the column entitled "Research and Development" and consists of the personnel allocations to the Plans & Development Staff.

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7. Accomplishments of the Program

For the past several years the program has been operating under stringent funding limitations at well below requested levels. Efforts have been concentrated on bringing to completion a number of significant development projects started during previous years and on initiating new projects designed to enable NPIC to cope with the products of new and improved collection systems as well as to keep abreast of the rapidly expanding reconnaissance technology. Major emphasis has been placed on improving management of the R&D program to better define its goals and objectives, prioritize its work and stretch its limited personnel and funding resources to meet the demands of the future.

With few exceptions, equipment used for photographic interpretation within NPIC has been developed wholly by in-house R&D efforts to meet Center needs. Virtually no off-the-shelf equipment has been available from industry with capabilities matching the extremely high resolution requirements of Center operations. Little equipment has evolved from the individual R&D efforts of other members of the Intelligence Community which was suitable for NPIC needs. In general, these elements have looked to the Center for leadership and have participated in the joint development efforts. The following three general categories illustrate specific examples of NPIC equipment development accomplishments. Similar accomplishments could be cited in each of the 13 categories of R&D effort.

a. Rear Projection Viewers

NPIC initiated the use of rear projection viewers as a basic imagery exploitation tool. Roll-film rear-projection viewers that were designed for "reading" missile-tracking photography were appropriated for scanning the U-2 17 mm tracker film. The advantages of group viewing and reduced fatigue offered by the rear projection viewer were immediately apparent. As a result, objectives were framed for rear projection viewers specifically designed for scanning conventional and high altitude reconnaissance. The resultant viewers and their derivatives have become standard throughout the Community. The leadership taken here

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has revealed to us the current limiting factors in rear projection viewer performance. As a result of this knowledge and that of advanced acquisition systems, NPIC has the lead in developing advanced components in rear projection systems for the future. Development contracts for an ultra-high resolution transparent phosphorous screen illuminated by ultraviolet light, advanced passive dispersion type screens, virtual image viewing systems, aspheric projection lens designs, high performance film transport systems, and highly optimized illumination systems are representive of the leadership exercised by NPIC in component development. This year our experience and background enabled the solicitation of bids for a totally automated rear projection stereo scanning system. Successful achievement of this development will represent another major advance in the presentation of reconnaissance imagery to the interpreter.

b. Precision Measurement Program

NPIC has been continually working towards improvement of the measuring capabilities of its imagery analysts and photogrammetrists. From a starting point which employed boxwood scales and slide rules, NPIC R&D has evolved several generations of ultra-high precision comparators, the latest of which are capable of measuring to a fraction of a wave length of light. The complex equations to be solved to translate microns of distance on the film to feet on the ground which would require weeks of time by teams of skilled mathematicians are accomplished in real-time by the linking of the precision comparator to a computer. NPIC introduced the use of the stereocomparator, previously limited to mapping applications, to the the reconnaissance exploitation community and perfected its design for reconnaissance applications. The unique high precision rear projection comparator has been developed to reduce the fatigue caused by prolonged microscope viewing and pointing and to provide a precision measuring capability to interpreters not skilled in photogrammetry. Where once measurements were made and translated laboriously by draftsmen to detailed drawings of installations, this same task is now capable of being performed automatically by high speed plotters while the measurements are being made on the comparator. A recent contract calls for the development of an automatic stereo-plotting system which will directly accept inputs from reconnaissance type stereo imagery and convert this to correct ground dimensions or scaled line plots.

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c. High Resolution, Versatile Stereomicroscopes

Virtually every instrument of quality used for viewing film in stereo in NPIC today has been developed by in-house R&D. The general concept of a stereomicroscope evolved in NPIC from crude prototypes to sophisticated, extremely high resolution instruments in response to changing needs. Whereas instruments of only five to eight years ago were limited to resolution of 100 lines per mm, present stereomicroscopes possessed resolution capabilities in excess of 1200 lines per mm. In addition to the basic resolution performance NPIC has developed other operationally significant features, such as independent magnification and image rotation control of each stereo channel, improved elimination, integral high precision image measuring systems, and variable ratio anamorphic eyepieces. Superior optical designs have been incorporated into new instruments and adapted to older ones to lengthen the useful life of available microscopes. Work in this area is continuing in the present image viewing program. NPIC is maintaining national leadership in the entire field of optical viewing aids for imagery exploitation.

In the management field significant advances have been made in the planning, initiation and control of the R&D program. The 15 major sub-programs devised one year ago were completely reviewed and consolidated into 13 sub-programs (see Tab 9); and program objectives were prepared for each of these new redefined sub-programs. A new system of project control was inaugurated permitting rapid analysis of the current status of various projects as well as the early discovery of bottlenecks in the program.

To advance the interchange of information between the various departments and agencies involved in imagery exploitation, a new Committee on Photographic Exploitation Equipment (COPE) was inaugurated during the year under the chairmanship of NPIC. This committee was formed by agreement between 7 government offices having interest in the exploitation of imagery, including NPIC, DIA, CIA, NRO, Army, Navy and Air Force. The Committee set as its primary objective the decreasing duplication of efforts by assuring that various government research and development organizations are adequately informed of all work planned and underway and to achieve dollar savings whenever possible by encouraging joint procurement. As an example, the joint procurement of 7 specific items of equipment during the past year resulted in the total savings to the U. S. Government of nearly [redacted] In addition, NPIC is continuing to publish a formal technical report listing all of the items under development in the R&D program and disseminating this report throughout the Intelligence Community.

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8. Problems Associated With the Program

Since its inception the research and development program has made significant progress toward fulfillment of its mission, in spite of limitations imposed by personnel shortages and cumbersome justification and procurement procedures. In the foreseeable future the major remaining problems to be overcome concern manpower shortages and insufficient early information about inputs to be expected from future collection requirements. In addition to the direct assignment of manpower to the Plans & Development Staff as outlined above, there is a crucial need to augment the supporting logistics staff responsible for the actual procurement of contractual programs. There is no adequate substitute for the permanent assignment of procurement personnel to the Center who will work closely with the technical monitors while still being responsible to the central Office of Logistics. The expertise and experience developed by contracting officers during a prolonged association with the program are irreplaceable for effective management.

Although the necessity for advanced information regarding collection systems under development is obvious, there is no mechanism charged with providing the automatic flow of such information. The Plans & Development Staff has overcome this shortcoming to the best of its ability by maintaining continuous close liaison with many government and non-government collection systems research and development efforts. Even this technique is naturally hampered by security limitations placed on these efforts.

9. Cost Savings Programs

As cited earlier a major objective of the program is to promote joint procurement activities among the various government agencies involved in imagery exploitation research and development efforts. Because of the uncertainties in the numbers, types and participants in joint procurement actions, it is not possible to predict in advance the expected dollar savings to be achieved from such a program. However, such savings will be reported as they occur as they have been in this report.

A second area of saving which is continually sought in this program is through the improvement of management techniques. Here again it is not possible to quantify these savings until after they have occurred. However, it can be conclusively shown through experience of other government organizations that additional technical monitoring personnel do bring about savings in the administering of external research programs by providing close and continuous liaison with those organizations where the primary work is being carried on. Expensive delays and project

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misdirection can be quickly spotted, eliminating unnecessary expenses to the program. These are just two of the bonuses to be achieved by closer monitoring. By adding additional personnel and seeking out new ways and means of efficiently managing a program of this magnitude, a continuous effort will be made to effect cost savings wherever possible.

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PART II. PROGRAMS PLANS AND PROPOSALS, FY 1968 - FY 1972

A. Information Processing and Exploitation - National Imagery Exploitation

1. General

In Part I A. of this study the scope and content of the National Imagery Exploitation Program were discussed including its historical origins, the funds and other tangible resources which have been provided the program, available manpower resources and how they are utilized, products and services of the program and major recipients, some of the principal accomplishments of the program over the past years, and major problems which face the Center during the upcoming fiscal year. In this section of the report the plans and proposals for the period FY 1968-1972 will be discussed together with a detailed description of how the resource requirements were estimated, objectives of the program, and principal problems and alternatives. The "CIA Planning Assumptions, Goals and Objectives" were used as the basis for the program planning as well as more specific assumptions which were developed for use by Center managers in compiling their estimated requirements. The more detailed internal assumptions are shown on Tab 5. Although the future role of NPIC in the National Imagery Exploitation Program remains to be clarified and awaits the result of the study of the Joint Imagery Interpretation Review Group, the planning reflected here is based on the assumption that the mission and functions of the Center will remain basically the same and that responsibility for carrying out the CIA planning objectives as stated in Annex C of the "CIA Planning Assumptions, Goals and Objectives" will remain with the Center.

During the next five years major investments must be made in the National Imagery Exploitation Program to provide the NPIC with the ability to adequately handle the mounting workload resulting from new reconnaissance systems which will be in operation during the period as well as to satisfy increased demands for services and support. The program requirements developed one year ago in the five-year planning exercise were reaffirmed this year with few variations and these variations are caused by more current data, primarily mission inputs, which govern the workload of the Center.

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2. Film Inputs

Fundamental to the estimate of requirements for this program are the estimates of film inputs expected during the next five years. The Center went to great lengths to obtain the latest and most accurate information on timing of upcoming systems. For satellite inputs, estimates were requested and received for the National Reconnaissance Office; and in order to adjust these to working experience and reflect a more conservative approach, arbitrary reductions were made by NPIC from the stated estimated inputs. Estimates of aircraft inputs were obtained from NRO, JRC and OSA/DDS&T. In the case of low-level aircraft systems where no definitive estimates could be obtained for the FY 1969-1972 period, NPIC arbitrarily cut the current experience in half although there is no assurance that this will actually be the case. In the case of other collection systems such as
real-time readout satellites and where no estimates were available, no provision was made in the 1968-1969 period although it is highly likely that some of these systems will be operational during this period. The film input estimates used in this planning exercise are shown in Tab 6 which depicts only operational footage and number of missions to be received by collection system for each of the FY 1965-1972. Operational footage is only that part of the mission covering foreign areas and which is subject to imagery exploitation. Engineering passes, domestic coverage, and other non-substantive portions of the mission were deleted from the estimates for more realistic estimating purposes. A detailed explanation of estimated film inputs that were used for the planning exercise is given in Tab 6.

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In reviewing that table of Estimated Film Inputs, it should be particularly noted that starting in FY 1967 nearly 6.3 million linear feet of film is programmed for exploitation in NPIC of which 355,000 feet will be satellite photography. Film inputs from satellite photography in FY 1967 will be 18% higher than in FY 1966. In FY 1968

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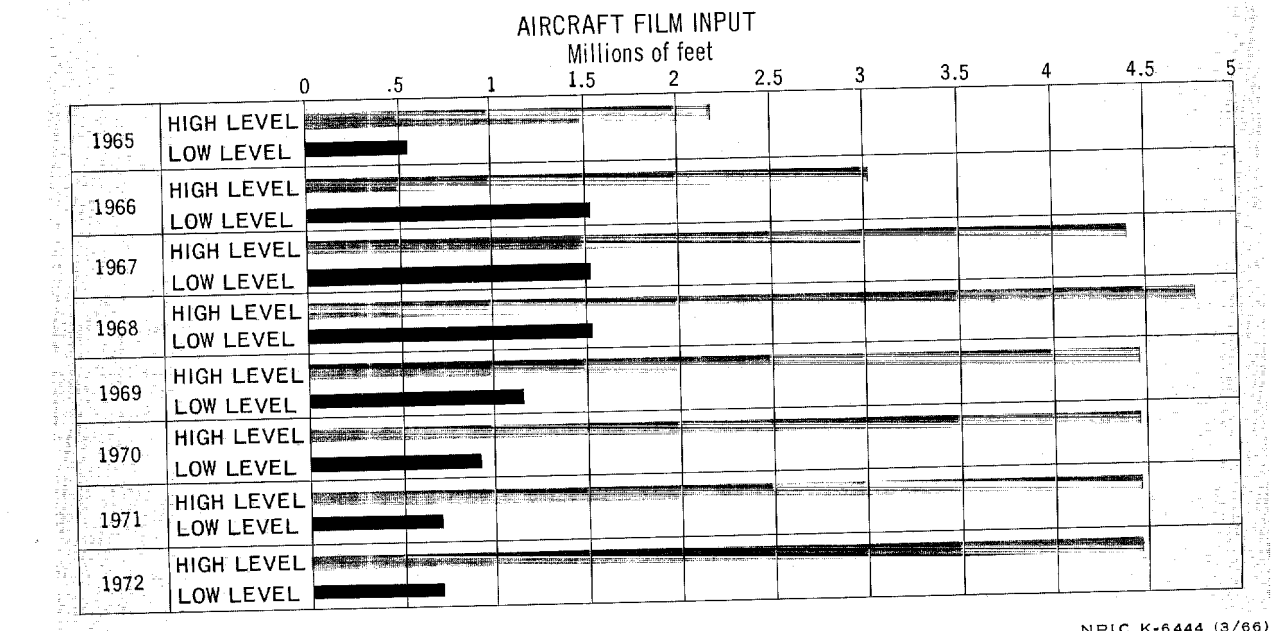

FIGURE 5. OPERATIONAL FILM INPUT, FY 1965-1972

a total of 6.8 million linear feet of film will be received by the Center, but of greater significance is the estimated satellite input, which is expected to reach 503,000 linear feet or 42% more than in FY 1967. In FY 1969 the total footage is expected to decline somewhat to 6.4 million linear feet, but satellite input is expected to rise to 778,000 feet or 55% higher than in the previous fiscal year. For the period 1970-1972, some decrease in estimated inputs from presently known collection system is estimated. However, it is fully expected by that time that real-time satellites, 25X1 25X1 NRO other new collection systems will more than make up for NRO this decrease.

3. Manpower Required

The second basic planning factor used for the preparation of these estimates was data from the NPIC Management Information System leading to the derivation of the manpower requirement. A summary of these estimates is shown in Tab 4 with one sheet for each of the fiscal years. For the purposes of this survey, the 12-month base period CY 1965 was selected as being the most recent and accurate reflection of current work efforts in the Center. Machine runs were prepared for each component showing actual manhour expenditures by function and by major category of work. Immediate exploitation, which is shown as mission exploitation on the chart, was further broken down by type of collection system. Actual experience factors were used for the two current operational satellite systems, KH-4 and 25X1 KH-7

Manhour per foot of film factors were next derived using MIS data with separate factors being computed for each of the production components and for each collection system. The factors used are shown in Tab 7 as well as the method of their derivation. The manhour per foot of film factor is the time taken by a given function to exploit a foot of film from a given collection system. This factor varies by function and by system, and for this survey aggregate manhour per foot of film factors were prepared for each of the operating components of the national center. 25X1

Using the table of film inputs and manhour per foot of film factors, the manpower needed for mission exploitation by each component was computed. Details of the methodology employed are shown in Tab 8.

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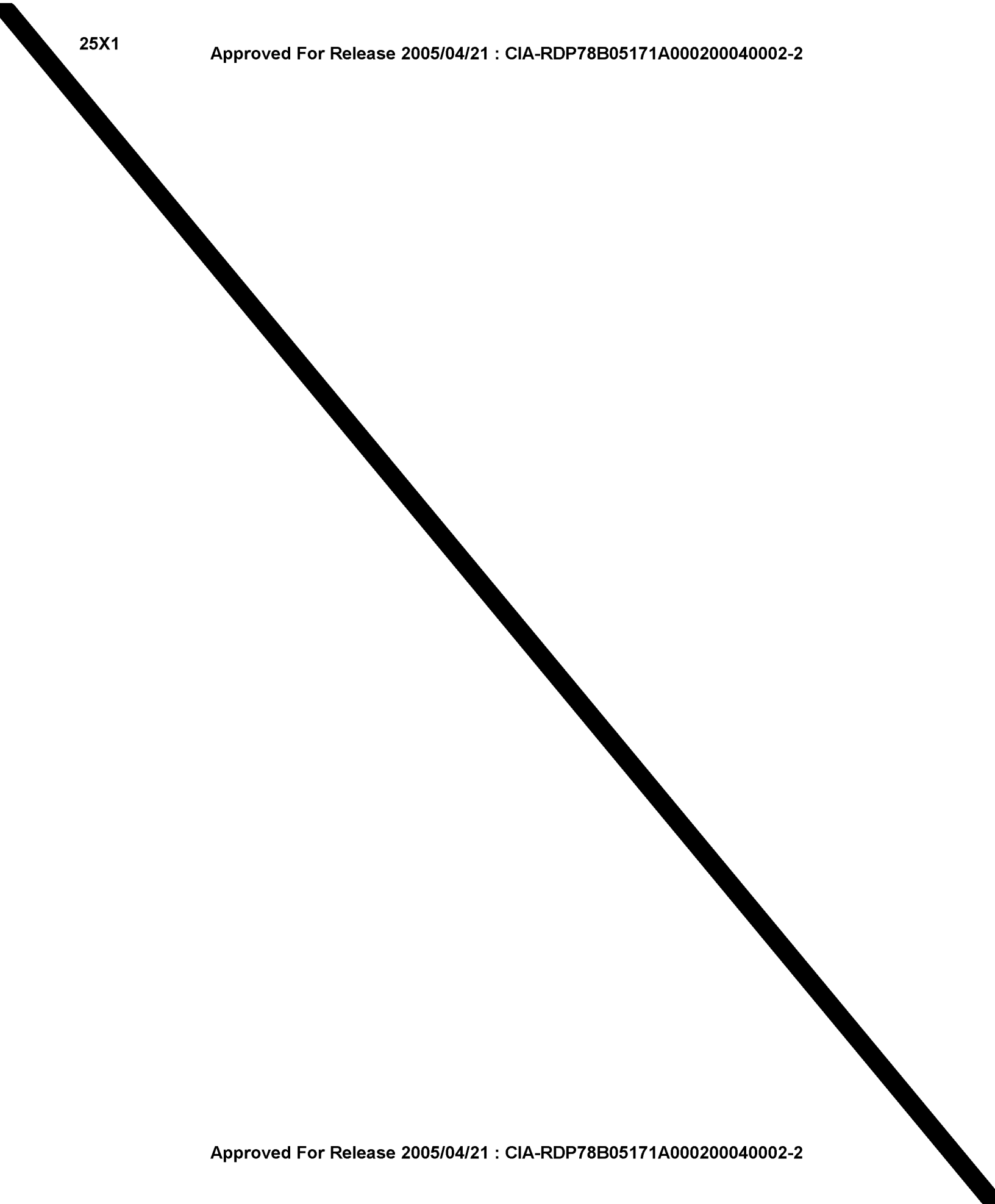

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Manpower estimates for mission exploitation were compiled first following which a study was made of requirements for detailed exploitation. Expected workload for detailed exploitation was analyzed keeping in mind the effect on requirements resulting from the increased film inputs of higher resolution photography, actual past experience of detailed exploitation in relationship to immediate exploitation, and current backlogs. In the five-year planning exercise of April 1965, a ratio of detail to immediate exploitation was used with the greater time being spent on detailed reporting.

While this approach was valid and accurately reflected actual experience over a period of years, a different, more conservative approach was taken in this study. This approach was as follows:

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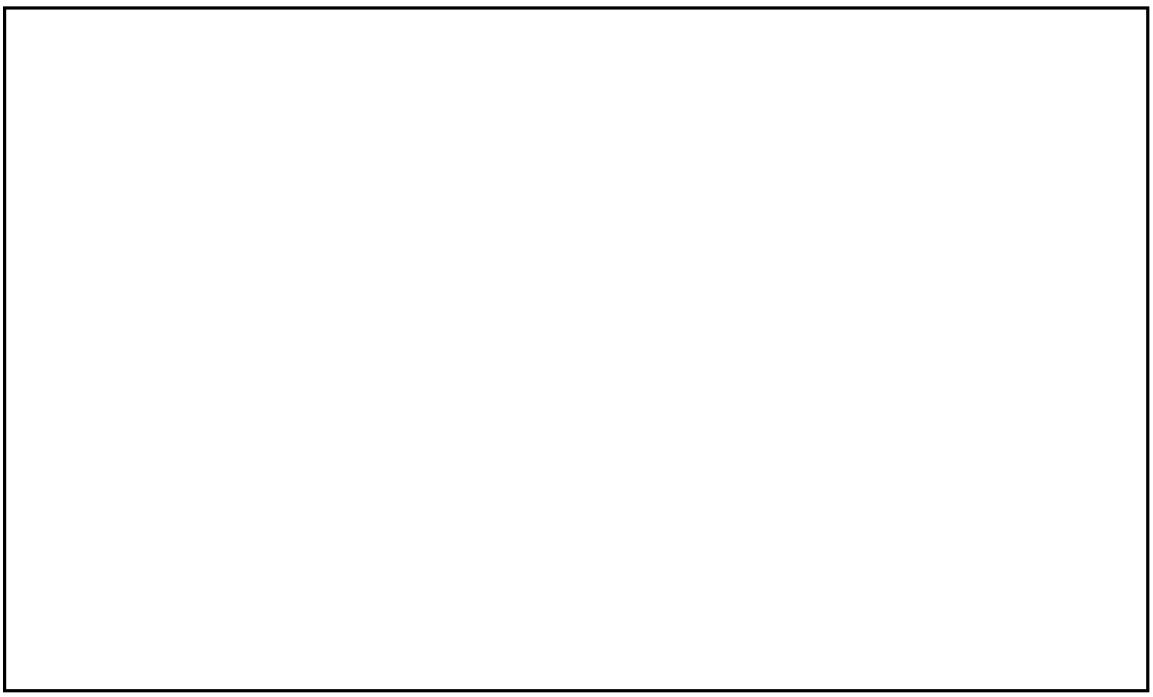

The next program element examined was "National Services" which involves a large number of different types of work projects not directly associated with immediate and detailed exploitation. Included in this element are such work efforts as preparation for and delivery of briefings, technical support to developers of collection systems, collateral support to COMOR, preparation of Mission Statistics, studies of stellar index photography, maintenance of the Reference Library, and a wide variety of other support services available in the national center. Manpower requirements for this element were calculated using various, applicable work measurement factors derived from the

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Management Information System and other production records. All detailed assumptions and planning factors used by the components in preparing these estimates were checked and rechecked, and any increases for a given function over FY 1966 levels were fully justified.

The next element considered was the manpower required for "National Support to Non-CIA Departmental Components." Included in this element are the efforts devoted by the Center to supporting departmental PI elements, primarily DIA and Army units collocated in in as well as certain other departmental elements in the Community which the Center supports such as NSA, various elements of the military services, and the State Department. Since no definitive planning factors were available for this element, the level of effort devoted to this support was maintained at the FY 1966 level for the FY 1968-1972 period.

The last element of the National Imagery Exploitation Program considered was the "General Management" manpower requirements. Included here were the requirements for the Office of the Director, NPIC, the Management Services Staff and Support Staff under the Assistant for Administration, the Operations Staff under the Assistant for Operations and the maintenance function under the Plans and Development Staff. To compile the manpower requirements for these components a functional analysis was conducted to determine the level of staff support required for the expanding national center, using as a guide the growth factors for the other elements of the National Imagery Exploitation Program. Increased manpower requirements in this program element are primarily attributable to expanding administrative support required for the larger Center, particularly in the area of logistics support, building planning efforts, recruitment programs and training efforts.

4. Funds and Tangible Resources Requirements

Using projected manpower requirements, the needs of the National Imagery Exploitation Program for funds and tangible resources were next compiled. Separate average salary costs were developed for each functional component utilizing currently approved FY 1967 budget levels. Other Personal Services costs were derived using approved budgetary techniques. To derive the equipment requirements for each of the functional elements of the program, a catalog of equipment together with expected prices and delivery dates was provided by the Center's Research and Development program to each of the national Center components. Complete detailed lists of equipment were prepared for each component, coordinated within the Center to ensure no duplication or overlap, and reviewed and cut back to minimum

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levels needed to support the program. Estimates for supplies, travel and other operating expenses were also compiled in great detail, reviewed and fully justified by each of the components participating in the National Imagery Exploitation Program.

To house the expanding activity of this program as well as the other programs under the direction of NPIC, additional building space will be required by FY 1968. Preliminary planning for acquiring this space has already commenced with current plans calling for construction of a building adjacent to the [redacted] Annex. Precise cost and configuration of this building has not been finally determined, but an estimate of [redacted] has been included in the FY 1968 funding requirements as a nonrecurring costs for building acquisition. To derive this cost a gross figure of $40 per square foot was used and a requirement of [redacted] square feet estimated for the expanded activity.

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5. Objectives of the National Imagery Exploitation Program

The basic purpose of the overall reconnaissance program is to provide maximum contribution to intelligence objectives in the timeliest fashion at minimum cost. This should be the basic aim of both the collectors and the exploiters since there is no other purpose in their existence. In order to achieve this, there must be among other things an overall balanced program so that the exploiter is capable of satisfactorily handling the inputs of collection systems, and conversely that he does not have an over-abundance of resources in comparison with the collection effort. Therefore, it would seem desirable to establish as the next objective, a program designed to work toward integrated direction of collection and exploitation of imagery to ensure a balanced program of maximum benefit to the Intelligence Community.

The photographic reconnaissance program is one of, if not the most expensive of the government intelligence collection and exploitation efforts. The Director of Central Intelligence and USIB set the requirements which in turn determine the collection programs. This is a national effort. From the exploitation standpoint, the DCI is charged with providing a national photographic interpretation center as a service of common concern. The Center is in existence functioning satisfactorily and capable of being expended to handle oncoming photographic inputs and other image-forming sensors. Another objective should be, therefore, to promote and enhance the status of this national organization so that in one spot the factual information to be derived from the readout can be extracted for the use of the entire Intelligence Community.

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The objectives simply stated are:

a. Render maximum contribution to the satisfaction of intelligence objectives in the timeliest fashion at minimum cost.

b. Work toward integrated direction of collection and exploitation of imagery to ensure a balanced program.

c. Promote and enhance the status of a national organization capable of integrating the imagery collected and producing in a single spot, factual information for the use of the entire Community.

6. Future Problems and Alternatives

At first glance the resource requirements of the National Imagery Exploitation Program would appear to be staggering and even possibly unreasonable. Given the planned inputs from the collection programs, however, NPIC planners can do no more than reflect conservative estimates of the exploitation costs for these new systems, and for maintaining and developing relating supporting services. Because of the high yield of information from this source of intelligence, these programs are being developed and pushed rapidly at tremendous cost to the government. Once collected, photographic and other image-forming sensors produce information much too valuable to remain unexploited. Photography and other imagery will be one of the prime sources of information to satisfy many priority intelligence objectives during the next five years. As quality increases and the level of details exposed to analysis grows, the answers to many more unsolved questions will become available. A capability to exploit these sources must be made available.

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In addition, as the size of U.S. boosters is increased, the pay loads to be carried may be enlarged and the film loads expanded accordingly. Greater detail and much more of it will require significantly expanded exploitation capability, notably in terms of people and funds and particularly for advanced instrumentation.

Thirdly, if leadership in exploitation is not maintained by the DCI it may by default pass from his control or be fragmented. Adequate

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and rapid exploitation of imagery is a necessity in the Intelligence Community today. If the resources to support this exploitation are not provided by the DCI, it must be assumed that the rest of the Intelligence Community will not be willing to sit by and see the imagery remain unexploited.

Finally, a fragmented exploitation program will cost the U.S. far more than the national program now possible of achievement. One of the basic purposes of establishing NPIC was to effect economy of exploitation, and although it cannot be conclusively proved, it would certainly appear that economy and efficiency have been achieved. To splinter the program at this point among duplicative exploitation efforts can only result in cumulative higher costs.

Therefore, the most desirable alternative to produce the most effective and efficient results would seem to be to provide the National Imagery Exploitation Program with the necessary resources in order that it may fully realize its objectives. During the past year some progress has been made in speeding up recruitment, expanding training programs and commencing on new building acquisition plans. However, timing is a critical factor; for while the Community is debating the future course of imagery exploitation, collection programs are pushing ahead unimpeded and on schedule. Critical decisions regarding the future of this program must soon be reached or the program will fail for inaction or lack of action in time. Provision of additional resources must be speeded up if the national photographic interpretation center is to realize the gains in reconnaissance technology in current systems and new ones just over the horizon.

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B. Information Processing and Exploitation - CIA Departmental Imagery Exploitation

1. General

In Part I B. of this study dealing with the FY 1967 operating program for CIA Departmental Imagery Exploitation, the serious problems facing the departmental effort in the immediate future were briefly reviewed, and a need for a substantial buildup over FY 1967 ceiling limitations was discussed. In this section of the report, plans and proposals for the period FY 1968-1972 will be discussed together with the specific assumptions used, a detailed description of how the resource requirements were estimated, what funds, tangible resources and manpower resources will be required for the work, and what results and accomplishments are expected as a result of these additional investments in this program.

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2. Planning Assumptions

In planning the resource requirements for the CIA Departmental Imagery Exploitation Program for the next five years, overall CIA "Planning Assumptions, Goals and Objectives" were followed for general guidelines, and the following factors were used as specific assumptions in making the detailed estimates. These are:

a. There will be increased inputs of film as well as expanding requirements for imagery analysis of new geographic areas of critical concern. The estimates of film inputs and their timing used in preparing the resource requirements for the National Imagery Exploitation Program apply equally to the departmental effort and will not be reviewed again here.

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b. There will be increased reliance by the Intelligence Community on imagery analysis to provide timely intelligence during world crises situations.

c. Improved film resolution and consequent demand for imagery analysis will create requirements for detailed exploitation in greater depth on scientific and technical subjects. There will be increased requirements for support to CIA in establishing a broadened industrial and economic intelligence base on China and other non-Soviet nations.

d. Daily and weekly imagery analysis reporting in direct support of CIA Intelligence Analysts will be given greater emphasis.

e. DDP components will expand their requirements for CIA/IAD support, both in operational areas overseas and at headquarters.

25X1 f. [redacted] imagery and color photography inputs will augment substantially the workload of the program.

g. Training of new personnel as well as experienced imagery analysts will require substantial investments in time.

h. Greatly improved film resolutions and the introduction of advanced imagery exploitation instrumentation will increase the average manhour investment per project.

i. Increased numbers of Agency personnel will have access to previously restricted information through increasing the number of security clearances or through downgrading existing source materials.

3. Methodology Used in Projecting Manpower Requirements

The CIA Imagery Analysis Division and its predecessor organizations have for many years maintained detailed records covering all aspects of its operation. During the past year this activity also participated in the NPIC Management Information System (MIS) thereby permitting a more detailed and thorough analysis of the various factors effecting the workload of the program.

As in the National Imagery Exploitation Program, the departmental effort is primarily affected by estimates of film inputs as well as the requirements for analysis from Agency requesters. Since the departmental program is colocated with the national effort, new film inputs are made immediately available to it; and the same input factors that affect the workload of the national arena have a like effect in

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the departmental area. The requirements for imagery analysts in the departmental area are based on film inputs translated into projects and the average manhours required per project. As shown in Tab 6 and Figure 7 , both the film inputs and the projects are expected to increase in the FY 1968-1972 period. As pointed out earlier, the Center has no control over the timing or quantity of film inputs, and for planning purposes, the best estimates of collection planners must be used. Despite continuous efforts to decrease the average manhours invested per project in the departmental area, there has been a steady increase in the manpower investment over the years which is expected to continue during the planning period. The actual average manhours expended per project in CIA/IAD was 39 in FY 1965, but at the end of the first seven months in FY 1966 this manpower expenditure had increased to 58 manhours per project. By FY 1972 planning factors and assumptions indicate an increase to 132 manhours per project as shown in Figure 7. This increase in both number of projects and manhours per project can be attributed to the higher resolution of new photographic inputs resulting in requests for more detailed and technical studies; introduction of multi-sensor materials requiring more time to compare imagery collected simultaneously from other media; and the need for additional time to assimulate the accumulations of earlier collection efforts.

The requirements for imagery analysis were estimated first, following which the needs of immediate supporting staff elements within CIA/IAD were prepared. Two such staffs exist within the division to support the analytical branches of CIA/IAD. The Production Staff has the responsibility for requirements handling, training, management data, publication review, security and liaison. The Operations Support Staff has a variety of diverse functions including audio-visual support; document control; technical equipment evaluation, issuance and accountability; and other supporting functions designed to permit the analyst to spend maximum time at his primary function. Manpower requirements for these two staffs were prepared based on actual work measurement factors and estimated workload in their functional areas.

To complete the estimating process for this program, the manpower requirements of the NPIC support divisions needed to support the CIA departmental exploitation effort were compiled using existing work measurement factors and stated requirements of CIA/IAD's needs during the planning period.

Funding requirements for the program were prepared based on the manpower projections for both the CIA/IAD and supporting elements of the NPIC support divisions. The same factors that were used in projecting the National Imagery Exploitation Program funding requirements were also used for this program. Detailed lists of equipment and procurement schedules were prepared, reviewed, and coordinated with national center to eliminate duplication of effort.

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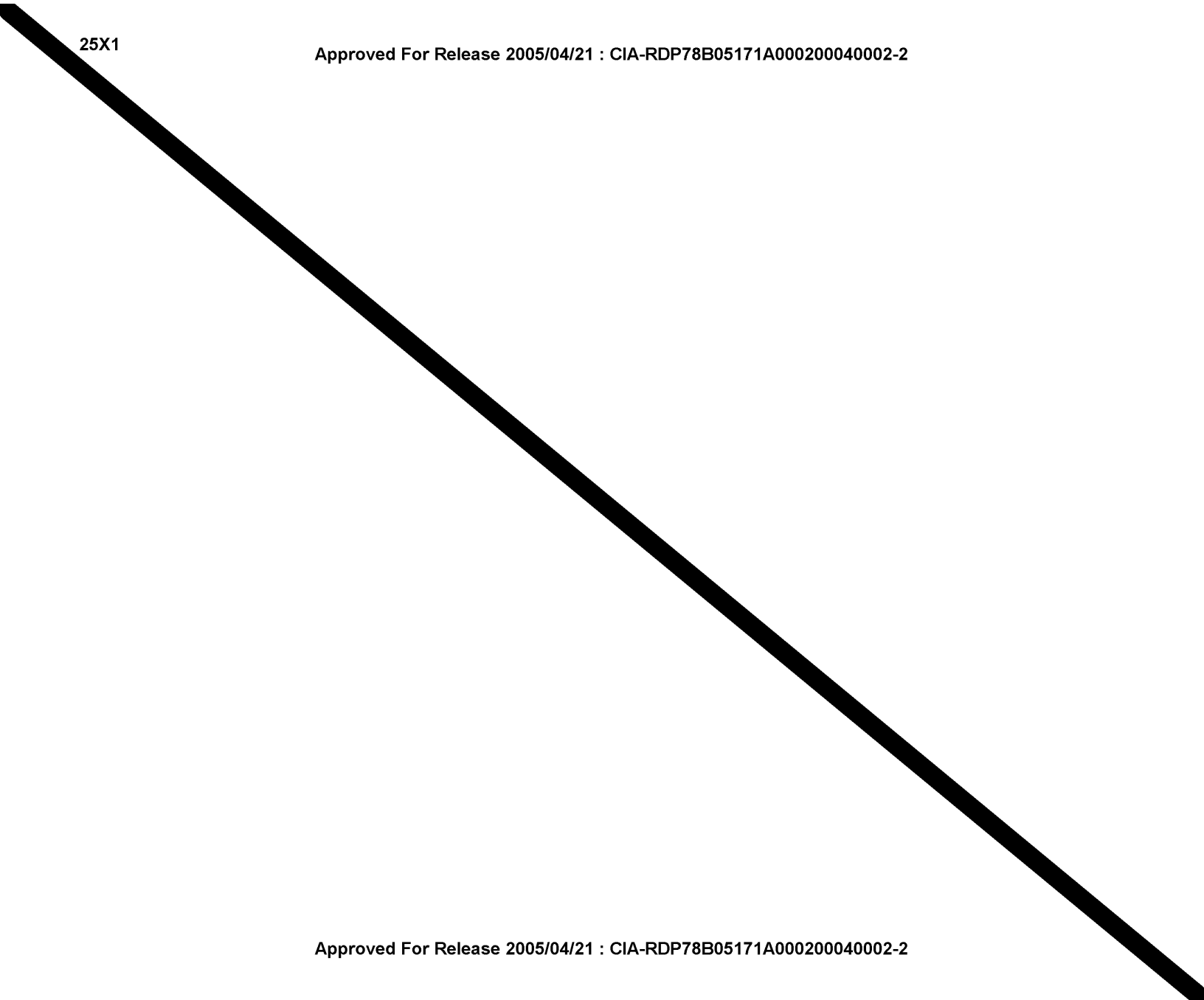

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4. Funds and Tangible Resource Requirements

In FY 1968 the CIA Departmental Imagery Exploitation Program will require approximately [redacted] to finance its operation, including [redacted] for supplies and equipment, [redacted] for personal services, with the remaining costs for other operating expenses. By FY 1969 funding requirements for this program are expected to rise to [redacted] of which [redacted] will be required for supplies and equipment, [redacted] for personal services costs, with the remaining [redacted] for miscellaneous contracts, travel and other expenses. Due primarily to non-recurring equipment costs, total funding requirements are expected to decrease to [redacted] by FY 1970, of which [redacted] will be required for supplies and equipment, [redacted] for personal services, with the remaining costs in miscellaneous operating expenses. Projecting into FY 1971 and FY 1972 funding requirements are estimated at [redacted] for FY 1971 and [redacted] for FY 1972 with the reductions in both of these years due again primarily to non-recurring equipment expenditures. Funds and provisions for additional building space were made in the estimated requirements of National Imagery Exploitation Program.

5. Manpower Requirements

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In estimating the manpower requirements for the program the timing factor is extremely important. The recruitment of additional imagery analysis personnel must precede the expected increase in film inputs, not parallel it. To be effective, this recruitment effort for professional personnel must be such that increases are effected 9 to 12 months in advance of their expected need in an operational status. This time is absolutely essential in order to have the required number of productive analysts on board at the time needed. The problem is not solved by simply having on duty untrained, inexperienced imagery analysts when the material begins to arrive in increased volumes, but to have these personnel trained and equipped to handle the increased workload from more technically demanding materials before it arrives.

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6. Expected Results and Accomplishments

The problems and handicaps dealt with in the operating program for FY 1967 apply equally as well to the five-year period FY 1968-1972 and will not be repeated here. The matter of the national vs the departmental issue has also been previously dealt with both in the National Imagery Exploitation portion of this study as well as the FY 1967 operating program for the departmental effort. The Director, NPIC has made proposals in this regard and in answer to the Joint Imagery Interpretation Review Group questionnaire. Further action in this field will await decisions and recommendations from higher authority.

The results and accomplishments to be obtained from an expanded CIA departmental effort are closely related to the National Imagery Exploitation Program and complementary to them. Past experience with the program has clearly proven that as long as the U.S. Government continues to make great investments in collecting increasing amounts of quality photography, the Intelligence Community will demand more and better detailed imagery analysis. Not to provide the resources needed to exploit this material is a gross waste of this vital source of information. For the Departmental Imagery Exploitation effort, the time is growing late. As in the case of the national center increasing resources simply must be provided to this program if it is to fulfill its established objectives.

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C. Information Processing and Exploitation - ADP Systems

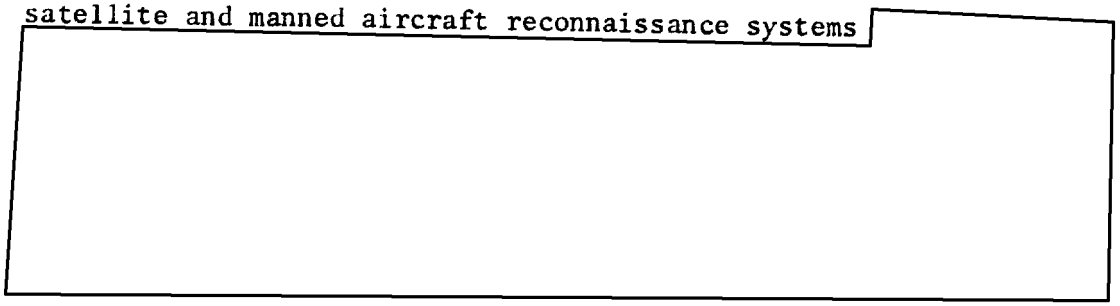
1. General

During the period FY 1968-1972, the Center's ADP activities will show a marked growth in complexity and sophistication. Plans for increasing volumes of higher resoltuion photography [redacted] 25X1
25X1 [redacted] and the anticipation of real-time collection/exploitation systems calls for the development of a fully integrated computer-based system and concomitant capabilities for multiprogramming and multiprocessing. The accompanying projection of ADP manpower and costs is based on the assumption that such a system can be implemented by FY 1969. It must be noted, however, that these projections reflect our best judgements of future ADP manpower and dollar requirements. Studies of NPIC's production process on which such projections may be more quantitatively and reliably based, are only now getting underway. In addition, the results and recommendations of the Joint Imagery Interpretation Review Group may have a profound effect on the bounds of NPIC's ADP plans. The present production process will, during the period, have to undergo major changes in operating philosophy and procedures affecting all parts of the Center. Specifically, we anticipate: changes away from dependence on listings and indexes of the entire data base to dependence on specific queries with responses machine-generated in real-time and tailored to specific needs of the requester; changes in publication procedure to reduce repetitive edit and rewrite, to reduce hard copy drafting, to permit automatic data base update and even publication by local or remote query of the data base; changes in the photo interpreter's operating procedures to provide him the background and reference information he needs - both textual and graphic - without the extensive human backup he now has; changes to aid the PI in recording his findings by reminding him automatically of the essential elements of information to be reported, formatting the result, providing titles, references, etc., automatically. Only with such changes will it be possible to process the vast quantities of raw data anticipated without a far larger investment in personnel.

Significant changes anticipated in each of the four major categories of NPIC ADP activities are as outlined below:

a. Computational Services - A second-generation Photo Measurement System will be designed and programmed to take advantage of improved capabilities of the dual multiprogramming, multiprocessing, UNIVAC 494 Real-Time computer system and to incorporate system modifications which are considered desirable based on experience with the present Photo Measurement System. The system must be capable of handling data from present operational

satellite and manned aircraft reconnaissance systems



b. Information Storage and Retrieval Services - Major changes in this category evolve around continued development of an integrated information system (development begun in last quarter of FY 1966). The final two phases, III (Systems Programming and Engineering Procurement) and IV (System Installation and Test) will be completed during this period. It is difficult to anticipate the effect that this study will have on NPIC information storage and retrieval services. However, it is felt that the use of on-line remote terminals for real-time computations will be extended to real-time updating and retrieval of information from the Center's substantive data files. The extension of COINS or its counterpart can also be expected during this period.

The Center's Document Information Storage and Retrieval System will be either replaced or substantially modernized beginning in FY 1969. The basic analysis of requirements for such a system is being started during the latter half of FY 1966. It will consider the possibility and applicability of remote display of documents as well as the relationship between storage and retrieval requirements of document images, reconnaissance images and other collateral storage systems. Based on these findings a new system will be designed and implemented for NPIC, becoming operational in the FY 1969-1970 time period.

c. Report Generation Services - There is evidence that the reporting philosophy of NPIC will change drastically during FY 1967. This, augmented by the feasibility study undertaken in FY 1967, may well result in: (1) incorporation into the reporting system of unique methods and/or equipment for expediting the preparation and dissemination of information; (2) dramatic increases in source data automation; (3) creation of a whole family of PI reports, both periodic and special, directly from the substantive data base; and (4) computer-assisted editing and reports composition.

d. Management Information Services - The second generation Management Information System will be installed during this period. The system will be responsive to the requirements for planning,

programming and budgeting within CIA while at the same time providing NPIC management with a real-time mechanism for monitoring Center programs. A major objective in designing the new system is the development of a capability for exception reporting and projective analysis.

2. Manpower Required

Manpower requirements for systems analysis, design and programming are a function of: (a) the number and complexity of new imagery systems being developed; (b) the exploitation techniques used or planned for use in interpretation of the imagery - i.e., the degree of automation; and, (c) the magnitude of the concurrent processing on-line real-time requirements of the data processing support system being developed.

Projections are based on the level of effort which has been invested in the development of data reduction systems concerned with two satellite systems (KH-4 and KH-7) and a high-level aircraft system, and on the known and anticipated requirements for ADP support in the areas of information storage and retrieval, report generation, and management services.

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Experience has shown that, in addition to original programming time, 1/4 to 1/3 of the total time devoted to developing a system must be expended annually in maintaining the system; i.e., making revisions to accommodate changing requirements, modifications to collection systems, etc. These requirements have been reflected in the manpower estimates.

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4. Funds and Tangible Resources Requirements

Major changes in ADP equipment configuration will have been made during FY 1967 (e.g., removal of IBM 1401 computer, upgrading of UNIVAC 490 computer to UNIVAC 494 computer and, at the very end of FY 1967, the addition of a second 494 central processor). During FY 1968 multiprocessing software will be completely checked out providing increased system reliability since, in the rare event that one CPU "shuts down", the other can take over to process priority work without delay. In addition to providing essential backup the second CPU will be required to meet operational workloads while at the same time providing essential checkout time for new system applications. Equipment requirements for the remainder of the period (FY 1969-1972) are largely for increases in memory and mass storage (both serial and random access), for communications equipment needed to service remote devices, and for the remote devices themselves. The ADP subcategory includes funds only for off-the-shelf remote terminals; funds for specially designed terminals are included in the R&D subcategory. Fund projections for equipment are based on the FY 1966 GSA price schedule and overtime rates.

Contractual assistance will peak during FY 1968, and is for the most part related to the completion of design and actual installation of an integrated information system. As the in-house capability in systems analysis, design and programming approaches the required level, the need for contractual assistance will begin to drop off as reflected in estimates for FY 1969-1972. Realistically, however, the budget must continue to provide for contractual support in special skills which it is not feasible to maintain in-house.

5. ADP Objectives

ADP Systems Objectives are directly related to NPIC and CIA objectives for information processing and exploitation:

a. Provide an on-line capability to photogrammetrists and photo interpreters for computational support in a real-time enviroment for all operational satellite and manned aircraft imagery reconnaissance systems.

b. Provide an on-line multi-access integrated information system to permit real-time storage, maintenance and retrieval of substantive information.

c. Provide report generation services which will result in the timely preparation and dissemination of NPIC PI reports.

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concerning the complexity of collection systems planned for the period FY 1968-1972, suggests that 20 to 25 man-years will be required to develop ADP systems to support each collection system. To ensure that the ADP systems are installed when the collection systems become operational, parallel development is essential; this, in turn, imposes stringent requirements for collaboration and coordination between those developing the collection system and those developing the supporting ADP system.

7. Cost Savings/Alternatives

The ADP system envisaged for the period FY 1968-1972 is designed to support CIA planning objectives calling for increased exploitation of [redacted] imagery [redacted] 25X1 by constantly orbiting satellites. Implicit in these objectives is a requirements for such capabilities as: (a) instantaneous updating of the substantive date base when reporting on a target, (b) on-line access (both from inside and outside NPIC) to information in the substantive data base, and (c) rapid call-up of comparative imagery regardless of collection sensor.

In view of these requirements it is difficult to relate NPIC's ADP activities to specific cost savings. Obviously the system will have to undergo a complete metamorphosis and extensive expansion within the next two years.

The system, however, will permit extensive cost savings within NPIC as a whole if compared with the projected costs for meeting the above requirements with the present ADP system. As explained in Section I, the ADP system is being designed to relieve the PI's and support personnel of many of their routine non-judgemental duties.

Within the ADP category significant cost savings are anticipated if compared with a projection of present methodologies. For example, the advent of the on-line system will permit a leveling off of computer operator personnel in FY 1969.

One result of automation is already evident in the substantially lower number of keypunch operators projected through FY 1972. A year ago we anticipated a need for 4 1/2 times the number of operators by FY 1970.

Within the ADP program many alternatives have been considered. It would be possible for example, to obtain all systems analysis, design and programming services by contract. We estimate this would more than

Employ advanced techniques of source-data automation, automatic typesetting, and computer-assisted textual and graphical manipulation to the extent that they are feasible.

d. Provide computer support to the NPIC Management Information System which will automatically supply statistical analyses required for planning, programming and budgeting as well as the data required for daily monitoring of ongoing activities.

25X1 NRO e. Prepare for the exploitation, [redacted] of photographic [redacted] images collected by a constantly orbiting satellite. 25X1

f. Up-rade computer hardware to ensure the necessary multiprocessing and multiprogramming capabilities to accomplish Objectives 5a through 5e at minimal cost.

6. Future Problems

The major problem during the period FY 1968-1972 will continue to be a severe shortage of trained systems analysts and programmers. We are seeking skills in what is a highly competitive market, and it will become more competitive in the future. Furthermore, we must realistically anticipate a high rate of attrition among systems analysts and programmers, since the market for these skills is fluid as well as competitive. A recent national survey showed that, on the average, professional ADP personnel change jobs every 2 1/2 years.

The intensive recruiting campaign which is currently underway is expected to yield a substantial number of analysts and programmers during FY 1967. It will be necessary to maintain a high level of recruitment and to continue to provide a salary scale commensurate with that in private industry throughout the period FY 1968-1972. With continuous intensive recruiting, we will reach the T/O levels requested by the end of the given fiscal years. However, at least six and normally 12 months of on-the-job training and experience are required for new systems analysts and programmers to become productive members of the organization. The difference between the availability of trained manpower and our requirements will have to be met with contractual assistance.

Exponential gains in technology are reflected in increasingly complex reconnaissance collection systems and exploitation equipment. The resultant demands for ADP systems to support collection and exploitation activities makes it paramount that sufficient "lead-time" is given for ADP system design and programming. Experience with early satellite collection systems (KH-4 and KH-7), and assumptions

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double our projected costs. It would be possible to install a second 490 computer instead of upgrading to 494's. This alternative, however, would substantially raise programming costs as the executive systems for the 490 have no where near the capability of the executive system being supplied with the 494. In addition, essential features of on-line query systems are missing on the 490; specifically, memory protection features which permit effective compartmentation of intelligence data within the computer.

Similarly, the need for a second 494 central processing unit has been carefully considered. Without such a unit the Center will have no capability for intelligence production should the primary 494 be inoperative. We have already had experience wherein both the 490 and 1401 were out of service for as long as four days at a time. Perhaps even more important however, the lack of a second 494 will impede the completion and checkout of new ADP applications. The checkout of new applications on the machine used for productive work frequently results in loss of the productive work in process.

ADP equipment needs are continually reviewed to ensure use of the most economical equipment to effectively do a job. For example, we have replaced UNIVAC's Communication Control Units with less sophisticated and less costly but completely adequate Communications Line Terminals at a savings of approximately [redacted] 25X1

D. Research, Development and Engineering - Production/Information - Imagery Exploitation

1. General

The operating requirements for the Imagery Exploitation R&D program in FY 1967 were reviewed in Part I D of this study and included a description of the origins of the program, its objectives, how the program operates, the resources which have been made available to it, some of the accomplishments achieved in the past, as well as problems currently associated with the program. In this section of the report, plans and proposals for the period FY 1968-1972 will be discussed together with the specific planning assumptions used, a review of the proposed program and the funding levels required, how the program will be carried out, the expected manpower resource requirements, and the expected results from the program. The objectives and major problems facing the operating program for FY 1967 will remain essentially the same for the FY 1968-1972 period, and will not be repeated in this section.

A 13 point program is proposed for the Center's R&D activity over the next 5 years designed to bring to bear the best minds and most advanced technology in the country directly on the critical development problem areas of the Center. An examination of the key functions of the interpretation and reporting process has highlighted the areas which have resisted more complete machine manipulation and automation. A coupling of this with an extension of work underway on the human aspects of the imagery analysis process provides the basis for this 13 point program. It is intended that these critical operations receive intensive development support and an all-out attempt be made to achieve significant breakthroughs in the technology.

It should be particularly noted that the current allocated R&D budget for the Center will do no more than pay lip service to many of the points in the proposed development program. Over a year ago, an FY 1966 R&D budget was proposed which called for a reasonable expenditure of about [redacted] 25X1 25X1 [redacted] As only about one-third of this amount was forthcoming, the planned program was pared back proportionately, with the obvious sacrifice of lead time resulting. The projected R&D funding requirements for the coming five-year period reflect the level of expenditure calculated to exploit the current state of technology which can and needs to be brought to bear on the Center's problem areas.

2. Planning Assumptions

In computing the funding requirements of the Imagery Exploitation research and development program, the following assumptions were used:

a. NPIC is responsible for the development of specialized equipment for the intelligence exploitation of image-forming collection systems and for providing information about such specialized equipment to interested elements of the Intelligence Community for their own use or for their adaptation.

b. The research and development budget projection must anticipate operational workloads and problems at least two to three years in advance, in addition to being responsive to many short-range operational requirements.

c. The R&D program workload is primarily related to rates of change in the priority, quantity, quality and fundamental nature of the materials to be exploited.

d. Much of the present equipment will be rendered obsolete by dynamic changes in inputs.

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e. Dynamic changes in output must also be anticipated. Among these are the response to a greater volume of requirements, the need for increased speed, and further implementation of automated reporting techniques.

3. Proposed Program

As described earlier, program expenditures ran to slightly less than [redacted] in FY 1965 and in FY 1966, funding levels were reduced to [redacted] During FY 1967 total program requirements are expected to run to the [redacted] level of which [redacted] will be used for external research programs. In order to keep pace with the rapid development being achieved in the collection field, it is anticipated that this figure will gradually increase in the FY 1968-1972 period to an annual funding of approximately [redacted] A detailed summary of the funding requirements for the external research programs for these years are shown in Tab 9.

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Listed below are a brief description and the current and anticipated funding for each of the 13 programs proposed during the next 5 years.

A technical briefing in greater detail can be arranged giving more specific details of each of these programs.

a. Exploitation Systems Integration Program

This program will integrate the entire NPIC exploitation effort. It begins with a systems analysis of the Center, which is currently being contracted, and will eventually coordinate the following 12 programs and all the NPIC effort for optimum effectiveness. The first expenditures, in FY 1967, will be approximately [redacted] rising to [redacted] in FY 1972.

b. Image Viewing Program

This combines the former Direct Viewing, Rear-Projection Viewing, and Modulated Light programs. It is concerned with the problems of illumination, film transport, correlation of collateral data, computer applications, lens systems, and screens. The goals are greater speed in exploitation, commensurate with increased volume and more rapid availability of imagery, and clearer viewing to maximize the extraction of intelligence from imagery. [redacted]

c. Human Factors Program

The continuing evaluation of human performance makes possible improved selection, training, and utilization of imagery exploitation personnel and more precise definition of their equipment requirements. The results are continually integrated with all other programs. [redacted]

d. Image Analysis Program

Intended to increase the knowledge about conventional photographic images, this program deals with image formation, recording, transmission, remote sensing, enhancement, reproduction, restoration, testing, and viewing. The information acquired will make possible the development of better techniques and equipment for imagery exploitation and will also assist those responsible for the development of collection systems. The [redacted]

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f. Automatic Target Recognition Program

While this program calls for extensive theoretical and feasibility study in the early phase, the fabrication of an automatic pre-screening system is envisaged in FY 1968, and a comprehensive automatic imagery classification system is planned for FY 1970. It is hoped that the program ultimately will not only identify targets automatically from conventional photography but will also make possible the direct machine analysis of imagery received in the form of electronic signals. Expenditures, which

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g. Automatic Stereo Scanning Program

This program involves the design and development of a scanning device which will give the photo interpreter automatic stereo correlation without the traditional stereo viewing aids and with automatic compensation for distortion. FY 1965 ex-

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h. Information Handling Program

This program speeds the production of intelligence by enhancing the velocity of information flow within the NPIC. Facets of the program include on-line communication between photo interpreters and a central computerized data storage bank, automatic readout equipment for collateral data, on-line mensuration, closed-circuit television, and compatibility with automated reporting systems. FY 1965 expenditures for this

i. Materials Handling Program

As opposed to the Information Handling Program, this program deals with the development of techniques and equipment for the physical handling of both collateral and operational materials. Studies are based on the problems of indexing, storage, retrieval, and security. Detailed investigations concern loading processes, the threading of roll film, and the positioning of individual photographs for viewing.

j. Reproduction Techniques and Equipment Program

This program involves development of techniques, materials, and equipment for improving the quality and speed while reducing the cost involved in the reproduction of both operational and collateral materials. Problems include automatically varying exposure during photographic reproduction to improve image quality, improved enlargements, color duplication, image restoration, image integration and manipulation, and unconventional (without the use of silver) photographic reproduction techniques. In FY 1965,

k. Precision Measuring Program

The fundamental requirement of this program is to improve the speed and accuracy of measurements based on photographic

imagery. However, developments are being made compatible with future collection systems and with advanced information handling techniques. Other major considerations in the development of mensuration equipment are environmental limitations and the problem of techniques for instrument calibration. Automation is being used to the maximum. 25X1

1. Reporting Techniques and Equipment Program

This new program is intended to overcome delays in the production of final intelligence products and reports. Initial investigation will center on electronic techniques for producing reports and graphics. Estimated initial costs in FY 1967 are 25X1

m. Miscellaneous

This category provides for requirements which arise in the normal course of events, but which do not fit into the specific programs outlined above. Expenditures in FY 1965 were 25X1
25X1 but fell to in FY 1966. Because of the increasing complexity of the NPIC exploitation effort, has been funded 25X1
for FY 1967, and it is estimated that will be required 25X1
in FY 1972.

4. Program Procedures

Responsibility for carrying out the above-outlined research and development program will be vested in the NPIC Plans & Development Staff. This organization is geared to attain maximum response to imagery analysis requirements through continuing working relationships with operating components, more finite statements of equipment requirements, and much closer monitoring of equipment development. In brief this organization performs 4 major functions, each attuned to a specific aspect of the research and development program.

a. Planning

This involves maintaining liaison with collection organizations, conducting analysis of Center activities as they relate to the development of R&D requirements, performing a continuing review of cost effectiveness of the research and development activities and

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preparing appropriate documentation.

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b. Development

In order to provide more effective control of the external research contract program, increasing emphasis will be placed on contract definition by establishing more rigorous specifications for the development of hardware. The key to this approach is the contract monitor whose work falls into two categories: contract definition and overseeing the contractors' performance. The object of contract definition is to determine the justification for letting each contract and to publish achievable performance specifications where warranted. This role is absolutely essential for the effective use of research and development funds. Unfortunately, in FY 1966 the dollar load per contract monitor is approximately double the average maximum which can be administered efficiently. Manpower projections for this activity anticipate lowering the average load per monitor to in contracts. In FY 1966

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c. Test and Evaluation

This function is concerned with the equipment performance and deals with suitability testing, installation engineering, and definition of equipment training requirements. There should be

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d. Exploratory Development

In-house laboratory tests and technical studies will be conducted to determine the feasibility of proposed development projects. In addition to providing technical and scientific advice, this activity has made increasingly useful contributions to the fundamental scientific bases for NPIC equipment development. This includes providing specific information regarding new areas of technology requiring exploitation and giving greater insight into the interrelation of the physical optical photographic and human processes.

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INTERNAL PLANNING ASSUMPTIONS FOR FISCAL YEARS 1967-1972

1. The mission and functions of the Center will remain basically the same, however, the full exploitation of image producing materials in addition to photography such as [redacted] color and a real time system will be required.

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2. The DIA will maintain parity with the CIA in providing imagery interpreters in support of national requirements.

3. Major emphasis will continue to be placed on cost reduction programs through improved management and increased productivity.

4. The estimated input figures, gathered from and validated by the collectors and then significantly reduced by NPIC, will be used by all appropriate Center components as a common basis upon which to project their manpower and dollar requirements.

5. Manpower usage data from the MIS will be used as a base in projecting manpower needed to exploit new and expanding inputs.

6. Improved film resolution will increase demands for imagery analysis in greater depth on scientific and technical subjects.

7. Requirements for National Services which include intermediate and by-products of the Imagery Analysis effort will continue to increase.

8. Increased imagery analysis will be required to support the expansion of the industrial and economic intelligence base on China and other non-Soviet nations.

9. Demands for imagery analysis in support of such fields as disarament and epicenter activities, crop conditions and mapping programs will increase significantly.

10. The services provided by NPIC to departmental activities (except for the CIA/Imagery Analysis Division) will continue at essentially the same level as during Fiscal Year 1966.

11. The level of support services required for CIA departmental activities will be estimated by the Imagery Analysis Division.

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12. The present level of activities which cannot be tied directly to an exploitation category will not be increased without specific justification.

13. Significantly greater expenditures of effort and manpower will be required for training in order to prepare Center personnel to handle inputs from the [redacted] and to operate new, complex optical and electronic equipment. 25X1 NRO

14. Manpower and financial projections will reflect the minimum level necessary to fulfill our responsibilities.

15. The space necessary to house NPIC personnel will be provided; however, double and triple shifts may be required for an indefinite period of time.

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NPIC METHODOLOGY FOR PROJECTING MANPOWER ESTIMATES

The Program Call for FY 1967-1972 prescribes that NPIC manpower utilization for FY 1965 and estimates of requirements for 1966-1972 be submitted under two program subcategories and one program element. In addition, NPIC has been asked to provide figures further broken down into NPIC programs. These NPIC programs, which differ somewhat from the classifications used in previous budget exercises and the 5-year plan for FY 1966-1970 are: KH-4; KH-7; [redacted] High-level Aircraft; Low-level Aircraft; Detailed Exploitation; National Services; Support to Non-CIA Departmental Units; CIA Departmental Imagery Analysis; Research and Development; and General Management.

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The mission-type systems or programs have remained the same [redacted]

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[redacted] The former categories Other National PI and National Non-PI have been consolidated into the NPIC program National Services; functions contained in the former categories Support to Departmental PI and Support to Departmental Non-PI have been reapportioned into the 2 NPIC programs Support to Non-CIA Departmental Units and CIA Departmental Imagery Analysis; the NPIC program General Management has been added, and the former category General Operations has been deleted.

These changes have been made essentially to conform to the Agency's new Planning, Programming and Budgeting system and to facilitate a more accurate presentation of NPIC's manpower needs. Thus, in order to indicate the manpower required to carry out any NPIC program in a given period, the total number of positions which must be allotted to this effort is shown, including provisions for the time personnel will be on leave, undergoing training, or occupied with certain administrative or supervisory duties. In short, the time required for duties and activities other than purely productive work is included with the requisite productive effort under any NPIC program to arrive at an accurate level of total manpower needed. Each NPIC program, therefore, includes all position or manpower requirements for its full exploitation or accomplishment, including all mission-oriented technical work undertaken by the Technical Intelligence Division, which has been included in the foot-of-film factors, and therefore, in all mission-oriented program projections.

The new NPIC program National Services comprises only that portion of national effort not directly related to a specific type of mission exploitation, the detailed PI reporting effort, support given to departmental

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units, or the staff functions of General Management. The NPIC program Detailed Exploitation refers to analysis and reporting in depth. The program Support for Non-CIA Departmental Units reflects the level of support required by departmental units other than CIA/IAD. The support required by CIA/IAD is shown in the program CIA Departmental Imagery Analysis. The NPIC program General Management comprises only that effort expended or projected for the Office of the Director, NPIC, the Administrative Area (A/A, MSS, SS) and the Operations Staff, it does not include functions of any of the operating components.

The specific methodology utilized in compiling the FY 1965 manpower allocations and the projections for Fiscal Years 1966-1972 was as follows:

1. FY 1965 (Actual)

The Agency Program Call requires that position allocations for 1965 be apportioned according to authorized strength and not according to actual on-board strength (the same is true for FY 1966 and FY 1967, although provision is made for over-ceiling requirements for FY 1967). The efforts actually expended on the original NPIC categories were grouped according to the new NPIC programs exclusive of General Operations time which was apportioned to each NPIC program according to the percentage of effort actually devoted to that program. Ratios developed from these new groupings of effort were applied to the ceiling figures for each component to arrive at the position allocations for each component by NPIC programs.

2. FY 1966

The manhour-per-foot-of-film factors were applied to mission footage input projections to determine the productive man-hours required to exploit the estimated inputs for each mission type. This figure was then divided by 1,352 which represents the productive man-hours available to one man for one year (the remainder is that portion of available time which is taken up by leave of all types, training, or general administrative duties). The quotient represents the manpower required for each mission program for the year. The quotient was reduced by 6% to account for that portion of mission exploitation work which must be accomplished on overtime because of mission scheduling. Since mission activities take priority, total manpower requirements necessary to exploit missions were allocated to those categories, and subtracted from the authorized ceiling. Whatever ceiling allocation remained was distributed proportionately against remaining NPIC programs on the basis of FY 1965 experience.

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3. FY 1967

The 1967 projections which must relate to ceiling figures were derived in the same way as those for FY 1966. However, as was previously noted, the Program Call provides for inclusion of over-ceiling requirements. NPIC is committed to exploit mission inputs as its first priority, and consequently these total manpower costs were calculated for scheduled mission inputs. As a result the non-mission programs were affected as over-ceiling requirements because the total manpower required for mission exploitation (reduced by 6% for overtime) was met from the ceiling figure. The following assumptions were used as a guide to determine the manpower requirements for the remaining NPIC programs:

a. The level of manpower requirements for Detailed Exploitation in FY 1967 was based on the level attained in FY 1966, and allowance was made to reduce the growing volume of incompleted work from previous years.

b. The manpower levels required for National Services in FY 1967 were determined by each component and requests for any increases over FY 1966 levels were justified by them.

c. The manpower requirements for NPIC Support to Non-CIA Departmental Units remained at the same level as in FY 1966.

4. FY 1968-1972

The manpower requirements for mission exploitation were derived precisely as in Fiscal Years 1966 and 1967 using the appropriate estimated film inputs, foot-of-film factors, and the reduction of 6% for overtime. The assumptions utilized to determine requirements for the remaining NPIC programs were also the same, except that a gradual increased effort on Detailed Exploitation was allowed through FY 1970 to cope with growing requirements and to reduce the backlog from previous years.

The FY 1967-1972 Program Call also requests a breakdown of the Center's requirements by geographic area for the period under review.

The methodology and reasoning used to arrive at this analysis were as follows:

1. The components carried under the NPIC program General Management (the Office of the Director, the Administrative Area, and the Operations Staff) were shown under the Worldwide/Inter-regional

category because the activities of these components do not involve any specific geographic areas but deal with all of the areas indirectly.

2. Data from the MIS were secured which showed by geographic area how the substantive productive capabilities of the operating components were spent during FY 1965. These data of course covered only the work that could be geographically identified. Using these data, the percentage of this effort applied to each geographic area was determined. These percentages were then applied to the total strengths of these components which gave the number of people by geographic area for FY 1965.

3. For subsequent years the percentage of effort of these operating components by geographic area was modified somewhat to reflect such things as:

a. Increased effort on the area titled Communist China/Communist Asia until it reached parity with the effort on the USSR;

b. A steadily increased effort on the USSR in terms of manpower, but a decrease in the percent of our total effort because of expansion;

c. Decreased effort on Cuba (carried under Western Hemisphere) in terms of percent, but maintaining the same manpower level;

d. Increased effort on Vietnam through FY 1968. North Vietnam will now be carried under the area titled Communist China/Communist Asia, and South Vietnam will be under the area titled Far East/Southeast Asia. Utilizing data from the Management Information System, 75% of this effort has been allocated against Communist China/Communist Asia, and 25% against Far East/Southeast Asia.

4. A relatively small build-up in manpower, but a decrease in the percentage of the Center's effort for the three remaining areas: Near East/South Asia, Africa, and Europe.

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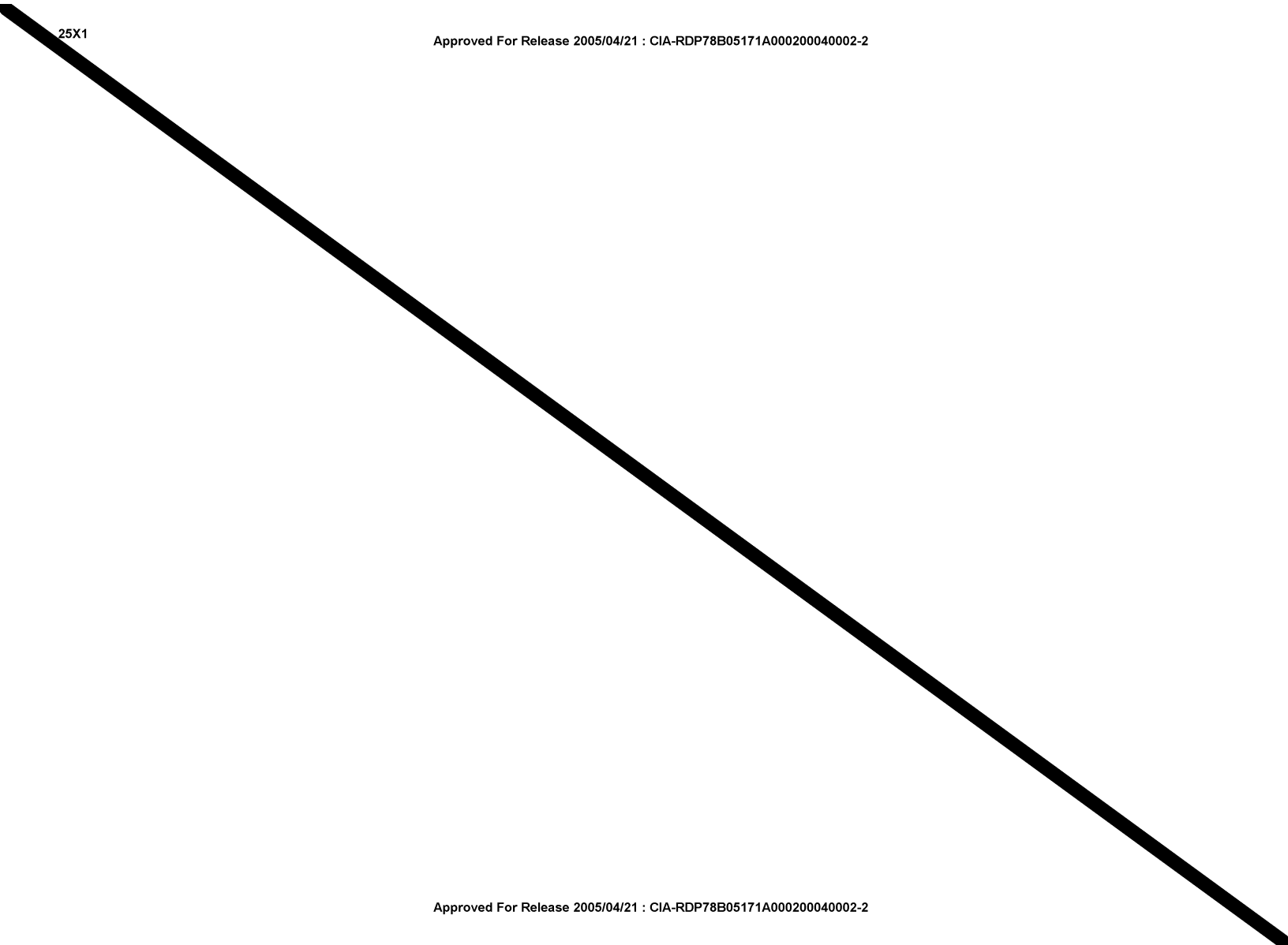

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